qTL
220
E38
NMAH

# INDEX TO VOLUME VII

# ELECTRIC VEHICLE

## January 1 to June 30, 1916


A

PAGE

Accomplishments of the Passenger Electric. By Gail Reed....141-143
Acid Proof Battery Room Floors....185-186
Advantages of Philadelphia Batteries. By James M. Skinner....8-10
Advantages of the Electric Car....104
Advertising With Post Cards....152
Ajax Sells to Employees....156
American Auto Invasion of England....140
American Prima Donna Purchases Electric....134
Among the Tire Makers....98
Anderson Electric Advances Prices....126
Anderson Expects Prosperous Year....76
Automobile Accident Records....166
Automobile Motor Characteristics. By Frank A. Putt....127-128

B

Birmingham Garage Busy....103
Booklet on Charging Stations Issued....154
Boston Battery Exchange System Growing....191
Boston Has Big Automobile Show....43
Boston Show Space Contracted For....10
Bretz Denies Rumor, J. S....150
Brevities of the Business....155-156, 192
British Electric Vehicle Progress....137-140
British Electric Vehicle Progress....178-180
British Embargo on Rubber....68
Business Opportunities....156

C

Care Important Factor in Tire Economy....76
Central Station Promotion of Electric Vehicle Use. By William P. Kennedy....183-184
Central Stations to Sell Lansden Electrics....126
Changes at Philadelphia Battery....81
Changes in Goodrich Detroit Branch....189
Charging Edison Storage Batteries. By E. J. Ross, Jr....21-22
Chesheir New District Manager of Milburn....98
Chicago's Annual Automobile Show....1
Chicago Electric Announces 1916 Models....79-81
Chicago Grocer Buys Eleven Electric Trucks....33
Chicago Selling Staff of the American Electric Car Company....2
Cincinnati to Stop Reckless Driving....47
Columbia Production Increased....150
Comparative Operating Data....19-20
Congestion Solution Is in Our Hands, The. Editorial....136
Converted Horse Trucks Damage Roads....104
Co-operation of the N. E. L. A., The. By E. W. Lloyd....69-70
Cost of Electric Truck Operation....151
Cost of Gasoline—The Electric's Opportunity....118-119
Costly Congestion at Terminals. By A. Jackson Marshall....99-103

D

Dangers of the Streets....67
Day Baker to Lecture on Selling Electric....64
Demountable Rim Patent Valid....40
Demurrage Eating Up Agents' Profits....114
Department Exclusively for Electric Garagemen, A. Editorial....18
Detroit Electric Development....3-7
Detroit Electrics Have New Branch....82
Detroit Establishes Mountain Climb Record....23
Detroit, Michigan, New Service Plans....158
Detroits at Aurora, Illinois....130
Developments of the Ohio Electric....11-12
Distinctive Home-Made Electric, A....177

E

PAGE

Easier Riding Promised....22
Easy Riding, the Big Point....70
Economy of the Industrial Truck. By W. F. Hebard....121-122
Edison Model Chicagos Offered....180
Editorial....92
The. Editorial....91-92
Electric Cars Defy Storms....72
Electric Delivery Cheaper....98
Electric Favored in Many Branches....72
Electric Is a Climber....115
Electric Leader in Real Comfort....112
Electric Motor Versus Horse....70
Electric No Longer Town Car....90
Electric Passenger Vehicle Problems and Activities. By E. P. Chalfant....167-171
Electric Pleasure Car Radiators....150
Electric Road Rollers and Better Roads....125-126
Electric Taxicabs for New York....15
Electric Tractors in Lumber Yards....97-98
Electric Trucks Demanded in England....90
Electric Trucks in Railway Service. By T. V. Buckwalter....65-67
Electric Trucks Use Increasing....103
Electric Vehicle Association Developments....34-35, 73-75, 107-112
Electric Vehicle Question Box....165-166
Electrics in Province of Quebec....162
Electrics Made Fool-Proof....85
Enclosed Cars the Year Around....82
Encouragement in the Price of Gasoline. E. V. A. Becomes a Part of the N. E. L. A., Extracting Customer's Check Painlessly....188

F

Fashions for Milady of the Electric....124
Fashions for Milady of the Electric....181-182
Faults of 1916 Cars....191
Fences Necessary Along Streets....70
Few Don'ts for Salesmen, A....144
Fighting Forty-Cent Gasoline....114
Fire Apparatus in Prospect....82
Flying Trip Wins Toledo Customer....112
Foreign Trade in Electrics. Editorial....136
Freight Handling by Express Organizations....152

G

Garage Owners' Annual Meeting....63
Garage Problem, The. Editorial....51-52
Garaging and Its Evils. By Robert Bland....29-30
General Motors Prosperous....130
General Vehicle Company Reports Good Business....130
Giant Tires for Service Truck....82
Gigantic Lamp Manufacturers Combine....130
Goodrich Board Increased....156
Goodrich Factories Near Completion....56
Goodrich Net Profit Over $12,000,000....76
Goodyear Opens Station in Dakotas....58
Goodyear Test Ends April 1....104
Goodyear Truck Tires Popular....103
Greater Speed for R. & L....82
Greatest Prosperity in History....112

H

Hard Rubber in Automobile Construction. By McConnell Shank....119-120
H. D. Eddy Joins Detroit Electric....116
Henry Ford Has an Electric for His Own Use 164
He's Not a "Porch Climber" But He Can Climb....162
He Wanted the Batteries on the Roof....189
High Cost of Gasoline Aids Electrics....77-78
Highways Will Boost the Truck....82
Historical Review of the E. V. A. A....86-90
Horse an Unprofitable Servant, The....41-43

I

PAGE

Improvements in Electrics....59-60
Industry's Most Important Convention, The. Editorial....135
Interesting Installation in Prest-o-Lite Battery plant....185
Is the Industry Big Enough for Its Opportunity? Editorial....173

J

Jacksonville Show March 6....76
Jamaica May Use Electric Vehicles....81

K

Keeping Step With the Times. By H. N. Tolles....53-56
Kind of a Car a Man Wants, The. Editorial....173-174
Komp Elected Lansden President....189

L

Law Requires New Dinner Type....153
London Electric Vehicle Committee Meets. By Frank Ayton....105-106
Losses by Flat Rate Method. By Francis Ingalls....24
Lure of the Open Road, The....163-164

M

Manufacture of Automobiles....85
Maryland Truck Bill Causes Trouble....151
McCall Family Scores Again....155
Method of Design and Operation. By S. C. Harris....31-32
Milburns for the Orient....43
Million Electrics by 1926, A....153
Milwaukee Safety Commission Elects....126
Milwaukee Show Gets Crowds....47
Motor Cars in U. S. Government Service....129
Motor Cars in Venezuela With 53-Cent Gas....154
Motor Truck Industry Prosperous....48
Motor Truck Men Seek Ferry Rates....68
Motor Trucks in Snow Removal....106
Motor Vehicle in Mexico....143

N

National Automobile Show, The. Editorial....17-18
National Automobile Trade Association....49-50
National Show for Trucks Proposed....76
Natural Motive Power, The. Editorial....18
New Changes in Organization....76
New Electric Company....123
New Incorporations....156
New Method of Locomotion....144
New York Edison Issues Interesting Booklet....47
New York Plans to Tax Truck Heavily....186
New York Vehicle Meeting....33
News of the Electric Vehicle Section, N. E. L. A....145-150

O

Ohio Demonstrates Its Hill Climbing Ability....172
Ohio Electric Gets New Chicago Location....81
Oklahoma City Taxes Electrics....90
One Hundred Percent Efficiency—24 Hours a Day....151
One-Light-for-All Vehicles Bill Is Passed....187
One Lonesome Electric in Peru....144
One Wheel Electric Tractor....20
Operating Characteristics of Lead Batteries. By J. H. Tracy....25-28
Oppose Tax in California....115
Owen Magnetic Car Absorbed by Bakers....60

P

PAGE

Pasadena to San Diego . . . . . 72
Peorians Get Show Rebates . . . . . 151
Plan Reserve of Trucks for Army . . . . . 114
Pneumatic Door-Opener for Garage . . . . . 123
Preserve Truck Tires by Not Overloading . . . . 64
President Bland's Message . . . . . 50
Problems of Cheap Garages, The. By S. Olvent . . . . . 39-40
Problems We Faced and Their Solution. By George H. Kelley . . . . . 57-58
Progress of the Electric Passenger Automobile . . . . . 13-16
Protecting Roads in Winter . . . . . 20

R

Radiator for Electric Passenger Cars . . . . . 33
Ready to Market Chair Cars . . . . . 180
Real Number of Trucks . . . . . 187
Reasons for Using Trucks . . . . . 115
Recent Chicago Purchasers of Detroit Electrics 120
Remarkable Trip to Kankakee, A . . . . . 164
Rental Battery System Proves Successful . . . . 35
Rhode Island Faces New Laws . . . . . 63
Road Conditions Hamper Car Sales . . . . . 106
Rochester to Buffalo and Return . . . . . 164

S

S. A. E. Discusses Glaring Headlights . . . . . 35
Safety Device for Electric Vehicles . . . . . 166

S

PAGE

Sales from Consular Work in South Africa . . 184
Scientific Transportation Methods . . . . . 175-177
Seattle Motor Car Show . . . . . 130
Seventy-Two Over Country Roads . . . . . 172
Show Records Broken at Chicago . . . . . 75
Silent Waverley at Chicago Show . . . . . 23
"Sociability Run" and Contest Held in New York . . . . . 164
Society of Automobile Engineers Make Recommendation . . . . . 134
Splendid New Service for Detroit . . . . . 171
Standardization of Motor Trucks . . . . . 85
Standardization of Tire Fabric Testing . . . . 131-133
Standardization of Tire Fabric Testing . . . . 190-191
Stick to the Business. Editorial . . . . . 52
Suggested Specifications for Springs . . . . . 44-47
Sutcliffe Succeeds Andrews in Edison . . . . . 75
Synthetic Rubber . . . . . 28

T

Tell Them to Use Electrics . . . . . 112
Third of a Million Miles on Solid Tires . . . . 158
Thirty-Ninth Convention of N. E. L. A. . . . . 157
Tire Prices Advanced . . . . . 63
Tires for Industrial Trucks . . . . . 159-162
To Buy Electric Trucks . . . . . 116
Too Many Promises. Editorial . . . . . 51
Town Has an Electric for Every 500 People . . 186
Trade Observations of a Traveler. By E. P. Chalfont . . . . . 61-62
Tractor Haulage in Terminals and Warehouses . . . . . 93-96

T

PAGE

Trailer Question, The . . . . . 113
Trailers for Trucks Grow Popular . . . . . 64
True Up the Wheels . . . . . 81
Truck Makers in United States . . . . . 68
Truck Men Meet . . . . . 68
Truck Load Is Limited . . . . . 60
Truck Tire Press Installed in Mobile . . . . . 186
Trucks Go Too Fast . . . . . 76
Trucks vs. Pleasure Cars . . . . . 60
Two Persons to Car Garage . . . . . 48
Two Profitable Cross Country Runs . . . . . 172

U

Union Transfer Company's Delivery System. United States Army Uses Many Cars . . . . . 71-72
By Charles A. Bothell . . . . . 83-85
Used Car Show Postponed . . . . . 150

W

Walker Issues New Catalogue . . . . . 81
Want Change Made in Delaware Law . . . . . 180
War Is Aiding Truck Builders . . . . . 68
Ward Establishes New Mileage Record . . . . . 241
Well-Known Accessory Firm Changes Its Name . . . . . 123
Westinghouse Charging Outfit . . . . . 187
Westinghouse New York Service Station . . . . 116
Woods Electric Now a Self-Charger . . . . . 37-38

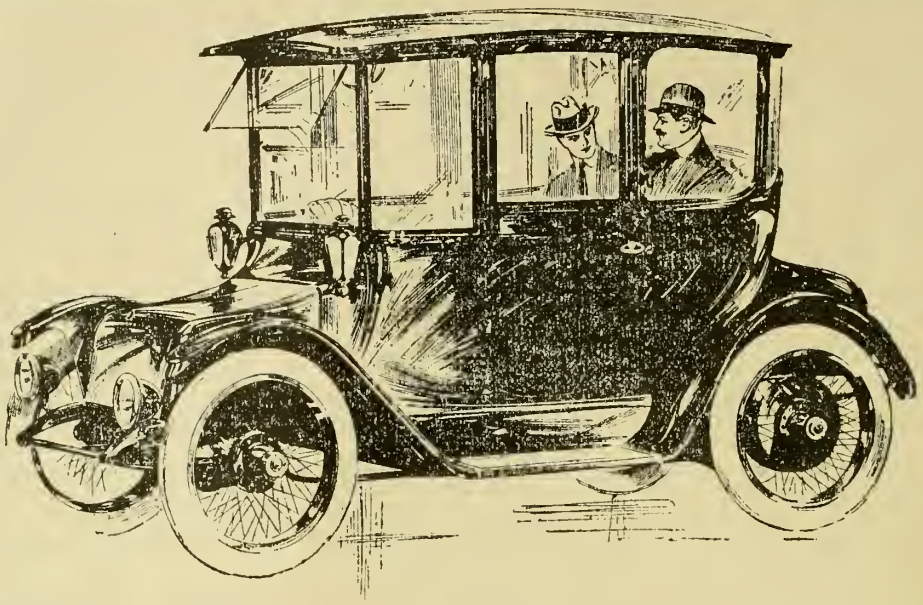
# ELECTRIC VEHICLES

A MAGAZINE FOR THE ELECTRIC CAR OWNER. $1.50 PER YEAR. 1253 MONADNOCK BLDG.

Vol. 8 CHICAGO, JANUARY, 1916 No. 1




1916 DETROIT ELECTRIC—MODEL 57



# Note Those Who Own DETROIT ELECTRICS

They are persons of taste and refinement. They are persons of discrimination to whom quality makes a strong appeal. They have measured the Detroit Electric and it has met their highest ideals.

A Detroit Electric reflects the good judgment of its owner. For the Detroit Electric has won its way to the supreme place in the enclosed automobile field, purely by reason of its quality.

The 1916 Detroit Electric is recognized as the finest enclosed automobile that has yet been produced.

It is the latest and best—in big things and little, in beauty and in mechanism, in equipment and in detail—of a Company which for years has confined its efforts exclusively to building high quality enclosed automobiles.

In this 1916 Detroit Electric you will find new attainments in point of power, in speed, in dependability, in ease of operation, and in operative economy.

You will find new refinements in comfort, in convenience, in design, in beauty, in utter luxury.

And above all—there is a new quality price. It will cause you to recast your former ideas of what a high grade enclosed automobile should cost.

*You will find the Detroit Electric on display in the center of the First Regiment Armory—the popularity of our car demanded double the space we had last year—concrete evidence that you cannot afford to miss this opportunity to view our 1916 line*

## Anderson Electric Car Company

**(Manufacturers Detroit Electrics)**

***World's Largest Builders of Enclosed Pleasure Cars***

Direct Factory Branch
2416 Michigan Avenue
CHICAGO, ILL.

CENTRAL DISTRICT

Factory Sub-Branches
MILWAUKEE, WIS.
SPRINGFIELD, ILL.
ROCKFORD, ILL.

# Volkcar Quality Batteries

## For Electric Vehicles

Are used as standard equipment in Chicago and are being guaranteed for 15,000 miles by the largest passenger electric car manufacturer in the world.

Marshall Field & Co., Chicago's greatest electric commercial fleet user equipped its last seventy trucks with

## Volkcar Batteries

That's what the largest electric passenger car manufacturer and one of the largest electric truck users in the world think of our batteries.

We invite your inquiry and wish to assure owners and garage men that we are at their service at all times in matters pertaining to the subject of storage batteries.

*Electric Vehicle Batteries renewed and parts furnished for either passenger or commercial electrics*

**VOLKCAR STORAGE BATTERY CO.**

**2441-43 Michigan Avenue, Chicago**

K.W. K.W.

When you

BUY

your new electric car

SAVE

money on both car and battery by getting it without a battery.

RENT

your battery on a monthly basis, which removes all uncertainty,

—FROM—

K. W. BATTERY COMPANY

CHICAGO

1532 Michigan Avenue

Tel. Calumet 3213

K.W. K.W.

Published Monthly By
ELECTRICITY MAGAZINE CORPORATION
Monadnock Building
CHICAGO

Entered at Chicago Post Office as Second Class Mail Matter

# ELECTRIC VEHICLES

WITH WHICH IS INCORPORATED IGNITION
TRADE MARK REGISTERED IN THE UNITED STATES PATENT OFFICE

SUBSCRIPTION PRICE
Domestic - $1.50
Canada - - $1.75
Foreign - - $2.00

FOR SALE AT ALL NEWS STANDS

If Your News Dealer Will Not Supply You—Please Notify Us

Volume VIII | CHICAGO, JANUARY, 1916 | Number 1

# Chicago's Annual Automobile Show

*The Greatest Exhibition of Motor Cars Ever Staged*

BY FRED B. SCHAFER

CHICAGO'S annual automobile show will be staged at the Coliseum and First Regiment Armory during the week of January 22-29. This year's event promises to be the greatest exhibition of passenger motor cars ever held. All motordom has shown enthusiasm in the coming exhibition and no stone is being left unturned to make this event the greatest ever promoted.

Major Miles has again been appointed to manage the exhibition and this alone is sufficient to insure success for the event.

Unlimited sums of money have been expended in preparing the interior of the exhibition halls to correspond to the elegance and grace of the new models. In this the management has employed prominent artists and designers who have secured the most attractive decorations possible.

The decorative scheme and coloring design flavors of the Orient. Cherry blossoms drape the various booths and extend across the ceiling of the main exhibition floor. Dainty cards of Oriental design and tinted in colors indicate the many exhibitors and their respective booths.

Practically all of the floor space has been reserved and according to the management many will be turned away because of a lack of space.

As customary in previous years, the main hall of the Coliseum will be devoted to gas car display. The balcony has been reserved for accessory exhibits.

The entire armory has been reserved for electric vehicle exhibits. Practically all of the manufacturers of electric passenger cars will be represented, some of the manufacturers with double space in order to give proper representation to their vehicles.

Many special models have been constructed for exhibition at the show. Some of these special models are upholstered in fancy fabrics, others giving a cross section of the vehicles showing construction. Specially prepared chasses are so constructed to show the method of mechanical operation and will assist spectators in learning of the simplicity of electric car construction.

Electric car manufacturers are enthusiastic in making this display attractive enough to secure public interest. For many years visitors of the annual automobile shows have practically devoted their entire time to investigating the gas car. This year it is expected that the electric will command the attention of many. Electric automobile dealers have made special effort to invite prospective purchasers to visit the displays and to investigate the electric in general as compared with the gas car.

The following electric automobile manufacturers will number among the exhibitors: The Anderson Electric Car Company, Detroit, Mich.; Rauch & Lang Carriage Company, Cleveland, Ohio; Walker Vehicle Company, Chicago; Woods Motor Company, Chicago; Waverley Carriage Company, Indianapolis; Ohio Electric Car Company, Toledo, Ohio; Century Electric, Detroit, Mich. Accessory manufacturers will exhibit tires, batteries, controllers, bodies, springs, upholstering, electric headlights, etc.

The announcement that the automobile salon will be held in the Auditorium Hotel during automobile show week, displaying a selection of the principal foreign and American cars from the salon in the Hotel Astor, New York, has brought expressions of surprise and approval from motorists as well as from the local automobile trade.

In the comment caused by this announcement emphasis was given to the importance of Chicago as a market for motor cars of the highest price, and the opinion was advanced that the salon is a proper recognition of the position of this market.

Until this unexpected show was planned it was believed that New York would be the only city in the world to stage an international exhibition of high-grade cars. London held no Olympia this year, nor did Paris have its usual salon, but the products of Europe's leading factories were shown in the New York salon side by side with the highest priced American cars.

The decision to repeat the salon in Chicago on a slightly smaller scale, therefore, means that the leading cars of international reputation will be assembled in the Auditorium Hotel. In fact, the Chicago salon will contain several foreign and domestic types that were not shown in New York. Electrics will also be exhibited.

## Visit the Armory

**The Annual Automobile Show presents a splendid opportunity to make a thorough investigation and comparison of all types of automobiles.**

**Don't fail to share your consideration and attention with the modern Electric passenger car.**

**Visit the exhibits. Compare the Designs and the Constructions. Learn of the Utility, Reliability and Economy of the Electric—the right automobile for the whole family, for all seasons and for all purposes.**

**A thorough knowledge of all these things will assist admirably in helping you to make your decision as to the most satisfactory type and the most efficient method.**



Penrose Reed.



H. R. Keese.



W. D. Kelley.



H. B. Cohn.



Robert Bell, Jr.



D. E. Whipple.



M. C. Kaufman.



J. L. Hebberd.



B. E. Adams.



George E. Veeder.



N. N. Burnham.



R. S. Gricfen.

J. R. Power.

C. W. Long.

J. P. O'Brien.

**Chicago Selling Staff of the Anderson Electric Car Company.**

# Detroit Electric Development

*Early History and Recent Methods of Distribution in the Central District*

THE world must indeed stand in awe when it stops to consider that the automobile industry of today has secured its phenomenal development and its gigantic popularity in a period of less than twenty years. From an entirely unthought of project it has grown into a great industry and promises even greater advance in the near future.

Nearly every one can remember the very first models which made their bow before the bar of public approval, later developing into absolute necessities and much-desired possessions for all purposes—business and pleasure.

The early history of the automobile will show its original manufacture being instigated and promoted by progressive carriage and buggy builders, who, even in very early days, foresaw the doom of the family carriage and the future adoption of the self-propelled vehicle. Few, however, anticipated that this development would ever reach its present magnitude, and some of these carriage builders who took advantage of the opportunity, are at the present time foremost manufacturers of the modern automobile.



*Anderson Electric Car Company, 2416 Michigan Avenue, Chicago. Central District Distribution Center.*

Way back in 1896, preceding the automobile era, The Anderson Electric Carriage Company was one of these progressive manufacturers of high-grade buggies and carriages.

The prominence of this company in the vehicle world at that time naturally prompted some of the earlier inventors and promoters of the automobile, then struggling for recognition, to appeal to this company for aid. Always progressive and ready to experiment with new devices, a number of the projects laid before the Anderson officials were carefully investigated and in some instances experimental cars were actually manufactured, but owing to the newness of the art, these early experimental cars proved a failure.

In October, 1906, a card bearing the name of George M. Bacon, E. E., was handed to Mr. Anderson. Mr. Anderson naturally assumed from the character of the card that he was about to be attacked by another automobile fanatic. It is not strange, therefore, that Mr. Bacon's first interview with Mr. Anderson was not a very encouraging one. "An electric automobile," said Mr. Anderson. "Well, perhaps that would not prove so disappointing as the others we have tried. If you really think you know how to build one, you may have the use of our factory facilities for a reasonable time, and we will purchase what material you need."

This co-operation was all Mr. Bacon needed. He buried himself in his work immediately and in the due course of time, just four months after beginning his task, he made an appearance in front of Mr. Anderson's office, proudly sitting in his newest creation. "If you don't think it will run just watch me start," said Mr. Bacon. Then the almost unbelievable happened. He touched a lever and without any noise, frightful explosion or jerks—the car quietly started on its way and kept going, going, going. Then just to satisfy himself that the car's performance was not aided by any occult devices, Mr. Anderson took the driver's seat himself and found to his delight that he, too, could easily control the car. It is reported that Mr. Anderson's enthusiasm and excitement were so intense that when desiring to stop the car after a ten-mile run, he kept yelling, "Whoa, whoa," but entirely forgot to pull the control lever back to its natural position. Now that all doubts about the successful operation of the car had been removed by actual demonstration, it was determined to begin the manufacture of the car in real earnest. The result was that in 1907-8 a total volume production of Detroit electric cars, amounting to 300, was realized. Naturally the major portion of the parts with which these cars were assembled were purchased from outside sources, as it was not considered wise at that time to seriously cripple the carriage manufacturing facilities of the company in favor of the automobile. But by gradual degrees the inevitable happened—the carriage business dwindled to nothing and was replaced by the new enterprise which was growing by leaps and bounds, even beyond the fondest hopes of a most enterprising manufacturer.

New buildings of the most modern type were erected and equipped with the finest machinery. Fac-

tory branches were established at main distributing points, such as New York, Chicago, Kansas City, Minneapolis, etc. To acquaint the general public with the sturdy qualities of the Detroit Electric and its capacity for speed and mileage, overland trips were made out of Detroit to such points as Mount Washington, Atlantic City and other interesting points. All this time the Company was growing and improving their manufacturing facilities. In 1911 the Elwell-Parker Company of Cleveland, manufacturers of motors and other electrical apparatus, necessary in the construction of electric cars, was purchased. The acquisition of this Company entitled the Anderson Electric Car Company to greater facilities which was but one step further in the scheme of development for greater and more efficient production.

Year after year this organization responded to the demands of the public for a better electric. Unlimited sums of money, the most efficient staffs of skilled workmen, greater manufacturing facilities and constant experimental research work, backed by time and capital were responsible for satisfying the demand of the public in the production of an efficient electric passenger car.

Every effort was extended to build a worthy vehicle, first and lastly to offer this type with all its merits at a selling price within the scope of the average purchaser.

This systematic endeavor was accompanied with great success by the Anderson company. In 1909 the organization found itself in an excellent position to extend its operating field to many of our greatest cities wherein topographical conditions were advantageous for the operation of an electric automobile.

It was at this time that the Chicago factory branch was established. Without a doubt, this was one of the very greatest steps which this company has ever made in securing its present prominence in the electric automobile industry. Chicago welcomed the inception of the new type. Development began at once, an organization was formed and the Detroit electric soon became a well-known product by automobile enthusiasts. The Chicago branch proved to be such an excellent centre of activity that four years ago the Anderson company decided to give this Chicago field the greatest possible co-operation from a sales standpoint. Consequently, the officials placed D. E. Whipple, one of the company's most successful sales managers, in charge of the Chicago office. Shortly afterwards, the organization developed with such rapidity that George R. Veeder was appointed to assist in the constantly increasing distribution. A selling staff, including some of the most successful men in the industry was carefully chosen and today represents an organization with maximum efficiency, and includes the following:

B. E. Adams, manager of wholesale, central district, was formerly connected with the Winton and Michigan gas car companies. In the last four years Mr. Adams has served the Detroit electric in the capacity of traveling representative with supervision over the central district territory and roadman both in the wholesale and retail sales.

R. E. Herrington, sub-branch manager, Rockford, Ill., was formerly a sales representative of the Woods Motor Vehicle Company, Chicago. Mr. Herrington, soon after, joined Carl Metzger and became a partner in the Metzger and Herrington Automobile Company, which at that time was distributors of Argo electrics. After the American Electric Car Company purchased the interests of Metzger and Herrington, Mr. Herrington was made general manager and remained in this capacity until a few months ago when he was appointed branch manager at Rockford. Mr. Herrington is probably the oldest electric vehicle salesman in Chicago and is well known both by the trade and the public.

Basil W. Ogg, sub-branch manager, Springfield, Ill., formerly was agent for Detroit electrics in Springfield. Mr. Ogg, in the four years during which time he represented Detroit electrics, increased the sales in Springfield nearly three hundred per cent. On August 1 Mr. Ogg was made branch manager and is well equipped to represent the Detroit in this territory.

J. R. Power, central district territorial representative, acted as traveling representative of the Detroit electric during 1912 and 1913. Mr. Power at this time left the service of the Anderson company and became affiliated with the Chicago electric. When the Walker Vehicle Company purchased the interests of the Chicago electric, Mr. Power again joined the Anderson Electric Car Company and is at the present time acting in the capacity of its traveling representative in Illinois.

C. W. Long, central district territorial representative, for five years was connected with the Waverley Company of Indianapolis as territorial representative. Mr. Long at the present time is representing Detroit electrics in Wisconsin, a territory with which he is thoroughly familiar.

H. B. Cohn, Chicago retail sales department, first entered the field as a representative of the Anderson company in Chicago. Mr. Cohn is very well known and since entering the business four years ago, has established a very successful career in promoting the sale of Detroit electrics. Recently he was promoted to the position of special representative of the Chicago branch.

Penrose Reed, one of the earliest promoters of the electric vehicle, secured his first experience in selling electrics with the Woods company of Chicago. He then became affiliated with the Detroit electric and after establishing a very successful sales record was appointed sales manager of the Chicago electric. When the Chicago electric was purchased by the Walker Vehicle Company, Mr. Reed returned to the services of Anderson Electric Car Company and has become one of the leading retail salesmen. Mr. Reed won the prize presented for the greatest number of sales made by any one salesman in the Chicago branch and is probably one of the best known electric vehicle salesmen in Chicago.

W. D. Kelley, Chicago retail sales department, previous to his affiliation with the Anderson Electric Car Company was a representative of the Tel-Electric in both New York and Chicago. During the time in which Mr. Kelley has represented the Detroit electric he has established a very successful sales record.

Robert Bell, Jr., was originally affiliated with the Woods Motor Company. Soon after he joined the forces of the Metzger and Herrington Company selling Argo electrics. His next connection was with the Chicago electric, after which he joined the Anderson Electric Car Company and is at the present time a representative in Peoria and Chicago.

M. C. Kaufman for a number of years was connected with the Borland electric. Later he became affiliated with the Chicago electric and a short time

after accepted a contract with the Anderson Company's Chicago branch in the retail sales department.

J. L. Hebberd secured his first experience with the Century Electric Car Company. Sometime later Mr. Hebberd became affiliated with the Anderson Electric Car Company in Detroit, Mich. He was then transferred to the New York City branch and recently became a member of the Chicago branch.

R. S. Griefen, Evanston and North Shore suburb representative, is well known in the retail end of the electric vehicle business in Chicago. Mr. Griefen secured his first experience as sales manager of the Ohio electric agency. Later he joined the McDuffee Company and exploited the sale of Rauch & Lang electrics. In 1914 Mr. Griefen organized the Baker Sales Company and was appointed manager. Mr. Griefen soon after accepted a contract with the Anderson Electric Car Company as representative in Evanston and the North Shore suburbs and has been very successful in placing a great many Detroit electrics in his territory.

H. R. Keese, one of the most recent additions to the Chicago selling staff, was formerly manager of the Baker agency at Atlanta, Ga. Nearly a year ago he joined the forces of the Woods Motor Company in Chicago and established a very successful sales record. Mr. Keese has many acquaintances in Chicago and he will probably reach a high mark in 1916 sales.

B. B. Burnham joined the Chicago retail staff the first of the year. Mr. Boonham is one of the best known electric car salesmen on Michigan avenue. For a number of years he acted as direct factory manager of the Waverley Company at Chicago and brings with him a splendid clientele of electric car owners.

In the past four years the successful strides of the electric vehicle, plus the individual and concentrated effort of the Chicago management, has been responsible for the thousands of Detroit Electrics which are operating in Chicago and territory.

The promotional work, the immense quantity of production, accompanied by decreased cost of production, finally brought about an era in electric car building. It was in August, 1915, that the Anderson company found it possible to gain world-wide interest in the announcement of an unusual price reduction,




*Springfield Sub-Branch, Springfield, Ill.*

which in the past five months has placed it on the highest pedestal of popular prominence.

A better model, at a price reduced from $600 to $725 resulted in such a demand that every facility was brought into action to supply orders awaiting shipment. A wide-reaching advertising campaign announced the new models and prices. This was responsible for many new changes in the policy of both the parent company and its branches. Sales began to increase. Great demands were made on every development and especially on the service depart-



*Lattner Brothers, Cedar Rapids, Iowa.*

ment. Extra assistance and more space were necessary. The Chicago management found it necessary to erect a large new service station just adjacent to its sales offices.

Dealers and individuals clambered for demonstrations of the new models and in the latter part of July, the Anderson officials decided to extend the field of operations of Chicago branch beyond the great metropolis. Consequently, the states of Iowa, Illinois and Wisconsin were placed under the management of the Chicago branch. Agencies of the best nature were established and this territory, now known as the Central District, was soon the scene of considerable Detroit Electric activity.

In past years, electric car manufacturers had avoided smaller cities. In some instances, agencies had been established and demonstrators shipped, yet in practically every instance the "side line" electric received but little development. The Anderson policy eliminated anyone from being a dealer who was not already connected in the automobile or garage business. This not only gave the electric exclusive effort, but brought about promotion by well-known representatives, which at the present time is taxing the factory to its utmost.

In the central district, the Chicago branch directs sub-branches and a large number of dealers and agencies. Practically all of these points of distribution are in charge of prominent automobile men, well-known in their localities and financially able to give the project financial assistance in promotion. Establishing these branch agencies throughout the country has not only added to the development of the electric car in general, but has extended the field of operation, including practically every city of any size.

In choosing representatives, the greatest care was taken in first selecting the proper city based on topographical population and financial resources, and secondly a reliable distribution. In this the Chicago branch officials have done well. A clientele of agencies has been appointed which in many cases are devoting their entire time and effort in exploiting Detroit Electrics. In other instances, dealers in high grade gas cars have established in conjunction with their regular sales forces, separate selling staffs to promote the electric exclusively.

The three sub-branches in control of the Chicago branch are located at Springfield and Rockford, Ill., and Milwaukee, Wis.

### Springfield, Illinois

Springfield is a city of more than 50,000 population. This is an ideal city for electric car operation. Its streets are level, wide and well paved. The city itself is prosperous and very promising for electric vehicle sales.

Basil W. Ogg conducts the sub-branch and already he has sold a good many Detroit electrics in his territory.

### Rockford, Illinois

Rockford, Ill., a sub-branch, is under the management of Roy E. Herrington. It is a city of nearly 50,000 population, located on the Rock River, and is the home of Roy Herrington, the sub-branch manager. The city itself is very applicable for electric vehicle development due to its excellent thoroughfares, wide and well paved. This territory has never been campaigned by any other electric car manufacturer and with the experience of Mr. Herrington and also his acquaintance in this vicinity, the Anderson company believes that Rockford will soon be a city of many Detroit electrics.

### Bloomington, Illinois

T. K. Hays, Bloomington, Ill., represented the Detroit electric during the 1915 and 1916 seasons, a short time ago having secured the services of Paul Tobin,



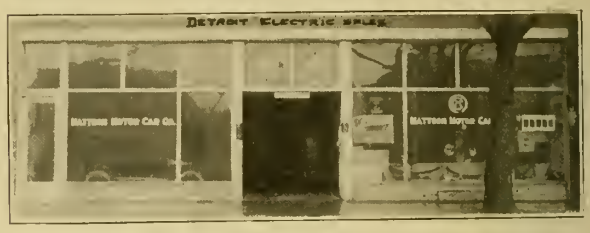

*T. K. Hays, Bloomington, Ill.*

formerly connected with the Woods Motor Vehicle Company in a territorial representative position, and who has had charge of the electric sales in Bloomington for Mr. Hays. The Chicago branch points with pride to this agency, because of the large number of Detroit electric sales which have been secured in Bloomington over a period of the past six months. This agency has demonstrated what can be done by concentrated effort in selling electric automobiles in a town of 30,000 population, where, previous to the 1916 season, electric automobile sales were few and scattered.

Mr. Hayes recently signed a contract for Decatur, Ill., for the representation of the Detroit Electric in this territory and has placed this new Decatur agency in the hands of Mr. Tobin whose success was so pronounced in Bloomington. Mr. Roys, formerly connected with the electric vehicle industry in St. Louis, has joined Mr. Hayes in Bloomington and will devote his efforts there in the exclusive sale of Detroits.

### Davanport Ia

Mr. Bashaw has had the Detroit electric account exclusively for past few years. Mr. G. A. Joy, former territorial representative for the Chicago branch of the Anderson Electric Car Company, seeing the possi-




*Mattoon Motor Car Company, Mattoon, Ill.*

bilities in Davenport for the promotion of Detroit electric sales, bought half interest in Mr. Bashaw's business firm, now being known as Bashaw Joy Company. Since this new firm arrangement was made, it increased the selling efficiency of the firm itself and made possible the proper financing of this business on a much larger scale. Detroit electric sales in Davenport have more than doubly increased. In addition to their local field, Messrs. Bashaw and Joy have placed a number of Detroit electrics in Moline and Rock Island, Ills., sister cities to Davenport.

### Dubuque, Iowa

Some few years ago L. A. Walch, well-known automobile distributor in Dubuque, Ia., purchased for his own and family's use a Model 35 Detroit electric. After driving this car for over a period of two years, Mr. Walch became so convinced of the practicability of the Detroit electric for every enclosed automobile purpose that he immediately secured representation for Dubuque. A rather interesting test was made in a Model 57 shipped to Dubuque. Mr. Walch, accompanied by four prospective purchasers, drove this car up what is known as the steepest hill climb in Dubuque, at a speed of fifteen miles an hour. This test




*Jacobson-Austin Automobile Company, Madison, Wis.*

was quite remarkable from the fact that very few automobiles, either gasoline or electric, have even ever attempted it. This test proved to the automoblie buying public of Dubuque that Mr. Walch had in the Detroit electric an automobile that would fill all of the demands of Dubuque motorists.

### Milwaukee, Wisconsin

For many years Milwaukee has been considered as an ideal city for electric vehicle operation. Besides being a city of immense wealth, it is topographically ideal. Its streets are wide, well paved and fairly level.

The Anderson company thought so well of Milwaukee as a center of distribution, that it has established a sub-branch with I. A. Crandall as sub-branch manager.



*Sub-Branch at Milwaukee, Wisconsin.*

Mr. Crandall has been affiliated with the Chicago retail sales staff for some time and is thoroughly trained and experienced in selling electric cars.

The branch is located at 586-604 Downer avenue. A well equipped service station has been established for owners of Detroit electrics.

Anderson officials believe that this branch will prove to be one of the best distribution points in the central territory and every possible co-operation will be made to fill Milwaukee's streets with electric cars.

### Neillsville, Wisconsin

Charles Cornelius, president of the Neillsville National Bank, and the owner of the Detroit agency in Neillsville, has been known as one of Wisconsin's greatest automobile enthusiasts since the first car was sold in his state. In addition to having placed a number of cars in Neillsville, Mr. Cornelius has been instrumental in selling Detroit electrics in his surrounding territory of Marshfield and other smaller cities.

### Green Bay, Wisconsin

Messrs. Smith and Straubel, Detroit agents, are young men, and thoroughly experienced in the selling and garaging of automobiles. They have successfully placed a number of electrics in their territory since taking on the agency and in but a short period of time. This firm looked over the entire electric automobile field and finally decided the Detroit electric was the ideal enclosed car to promote the sale of in Green Bay.

### Racine, Wisconsin

Racine sales are being made by the Electrical Construction Company. Although this territory has been but recently opened, the agency is making rapid progress.

### Minonk, Illinois

Minonk Garage Company has just contracted to sell Detroit electrics in Minonk. The dealers are well-known business men and are certain of many sales in the coming year.

### Jacksonville, Illinois

L. F. O'Donnell, representative at Jacksonville, Illinois, in a recent interview stated that the outlook for electric car sales was splendid and that he expected to close many sales in the next six months.

### Quincy, Illinois

The opportunity of making agency connections for the sale of Detroit electrics in Quincy has just been accepted the past few months. This territory has An agency contract was closed with Mr. Giefing of the Storage Battery Supply Company, and provisions made by this firm for the building of salesroom, offices and service station for the successful selling and rendering of service on Detroit electrics in Quincy. This agency is looked upon by the manufacturers of the Detroit electric as one which will in the next few months increase the sale of their product to a large extent, by reason of the proper facilities, and Mr. Giefing has already secured the services of an experienced electric automobile salesman, who will devote his entire time to the sale of Detroit electrics, in Quincy and adjoining territory.




*S. and S. Motor Car Company, Green Bay, Wis.*



*Spry & Diller, Des Moines, Iowa.*

# Advantages of Philadelphia Batteries

*Economic Value of Thin Plate Batteries in Electric Truck Service*

BY JAMES M. SKINNER*

THE Philadelphia thin plate battery has now completed its sixth year of successful operation in electric truck service. Put on the market in 1909, the type WT has been improved and perfected, year by year, being succeeded in 1912 by the lighter, higher capacity WTX, and reaching its highest development in 1915 in a still lighter, still higher capacity type, the WTXI. The WT quickly displaced the older, heavier type of plates which had been standard prior to 1909, the WTX displaced the WT, and the WTXI in turn is now engaged in displacing the WTX.

The first big advantage of Philadelphia thin plate batteries is that they are "oversize." The trend of the times is toward "oversize" equipment. We use tungsten lamps, not of the same candle-power as the carbon lamps of a few years ago, but of higher candle-power, electing to obtain more light rather than lower cost; in all directions we demand a bigger margin than heretofore. Philadelphia thin plates meet this demand as applied to electric trucks. Users want more mileage than formerly. Philadelphia thin plates have increased the daily mileage of electric trucks from 50 to 100 per cent. Philadelphia batteries maintain higher car speed. An electric pleasure car equipped with a standard Philadelphia WTX battery made the trip from Philadelphia to Boston at an average speed greater than 20 miles per hour.

At first glance it might appear that the demand for "oversize" equipment is unwarranted, and that people are buying something that they cannot use. The electric truck of a decade back had neither the mileage nor the speed of the present-day thin plate equipped car, yet it went about doing its work and apparently gave satisfaction. Of what use then is the increased mileage and speed of the present-day car? The answer is that greater mileage and higher speed have added immensely to the radius of operation and the flexibility and the reliability of the electric, and have decreased battery maintenance costs. They have brought a larger field of operation within the capability of the electric and have reduced the operating expense. If the daily mileage required is small, a thin plate battery need only be charged once every two or three days. If snow or bad roads cause excessively high power consumption, the "oversize" characteristic of the thin plate enables the car to cover its usual route without difficulty. If conditions change and longer distances must be traveled per day, the battery is ready and able to meet the demand. Even if the mileage required is 25 or 30 per cent greater than can be supplied by the normal capacity of the battery, 25 or 30 per cent additional capacity can be obtained from the battery by means of an hour's boost at noon or a few minutes' boost each time the car returns to the loading station. By simply varying the amount of charge given to the "oversize" thin plate battery the car automatically takes care of short routes and long, good weather and bad, dull seasons and rush times.

This means when reduced to concrete figures, that the mileage capacity of a one or two-ton electric ten years ago was 30-35 miles. The first Philadelphia thin plate, the WT, increased this to 45-50 miles. The WTXI will give 55-65 miles, and with the aid of a little boosting, 75-80 miles per day. In other words, the mileage capacity of the present-day thin plate equipped electric is double that of the electric of 10 years ago. It may be shifted on a moment's notice from a 20 to 50 or a 60 mile route. The big "oversize" thin plate battery makes it adaptable for every emergency of city delivery.

The second advantage of the Philadelphia thin plate battery is moderate price. The initial price is the lowest possible for a high quality battery and the renewal price is approximately only 65 per cent of the original price. The low price reduces the investment and brings the cost of the car within the range of the small merchant. Low initial battery cost is also of importance to the user of a fleet of trucks. A saving of from $500 to $1,500 per car on the price of the battery does not seem so much in itself, but when multiplied by the number of batteries used in a fleet of 20 trucks it amounts to the respectable sum of from $10,000 to $30,000. The low initial price of the Philadelphia thin plate batteries is of value to both the large and small user.

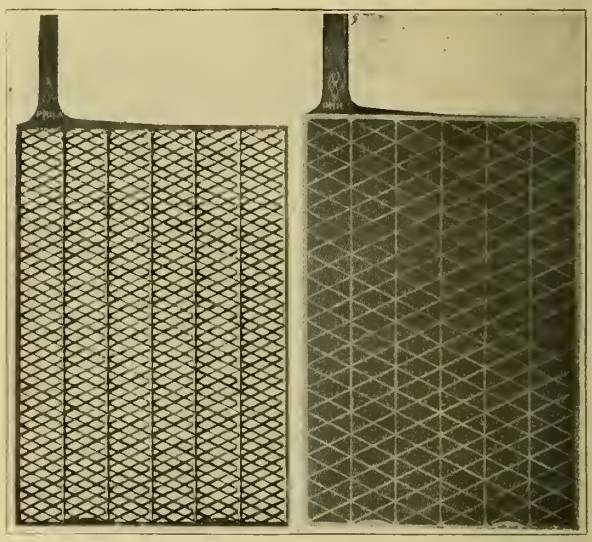


*Fig. 1—Diamond Grid Used in Philadelphia Thin Plates.* *Fig. 2—The Finished Plate, Showing Truss Construction That Insures Rigidity.*

The third advantage of Philadelphia thin plate batteries is low operating and maintenance cost. This is the product of many factors. A big factor is the "Diamond Grid." Philadelphia thin plates are all pasted upon the diamond grid. The diamond grid is built like a bridge truss with members so interlacing and having such mechanical strength that buckling is practically impossible. The interlacing of the members, moreover, provides another exclusive Philadelphia feature. The active material is actually locked

*Chief Engineer, Philadelphia Storage Battery Company.

between the members on the opposite sides of the plate and cannot jar loose and fall out.

Another factor is the Philadelphia long-life paste composition, developed especially for thin plates, in combination with the Philadelphia hard wood separator. It has been argued that it is useless to use exceptionally long-life plates in storage batteries, since exceptionally long life could not be realized because of premature failure of the wood separators. This argument has force when applied to batteries containing ordinary soft wood separators. The life of the plates in such batteries is often limited by the shorter life of the soft wood separators. Philadelphia hard wood long-life separators are an important feature in Philadelphia thin plate batteries because they permit the realization of maximum plate life.

Still another factor in low operating cost is the high rib, high quality rubber jars. The high ribs provide sufficient space underneath the plate to accommodate all of the sediment accumulated during the life of the battery and no expensive, time-consuming cleanings are required. The high quality means more new rubber in the jars, and adds to their cost, but it practically eliminates jar breakage. All Philadelphia thin plate batteries are assembled in high rib, thick walled, high quality jars.

The high efficiency of Philadelphia thin plate batteries is another factor which reduces the operating cost. The Philadelphia thin plate battery requires less current per car-mile than any other battery on the market. The alkali battery, as is shown by records of actual operation, requires at least 40 per cent more charging current. This item alone represents a saving in using the Philadelphia thin plate of from $50 to $300 per year, depending on the size of the car, the miles run and the cost per unit of charging current.

Another factor in the low operating cost of Philadelphia thin plate batteries is the small amount of regular daily attention they require. Regular charging, systematized to avoid gassing and heating, and periodic flushing with pure water constitute the sum total of the attention required. In fact, experience has shown that the less attention given, beyond ordinary cleanliness, systematic charging and regular flush-

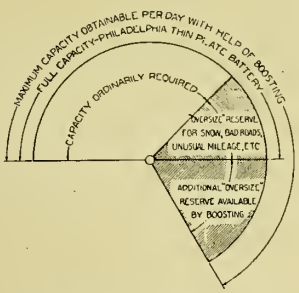



*Fig. 3—Diagram Showing Capacity Range of Philadelphia Thin Plate Batteries.*

ing, the better the results obtained. There are on the market today many forms of charging apparatus, low in cost, efficient and absolutely reliable, which automatically give the battery a proper charge with no attention or adjustment whatever on the part of the operator. Such apparatus to date has found its largest application in the electric pleasure vehicle field, but there is no good reason why it should not be just as widely applied in commercial battery charging. Philadelphia engineers are always ready to co-operate with car owners in the selection of operating apparatus suitable to their requirements.

The final factor tending toward long life, and therefore lower maintenance cost from Philadelphia thin plate batteries, is their "oversize" characteristic. Thick plate and other low capacity batteries in electric trucks are often overworked. They are overdischarged and overcharged. In order to give maximum life a

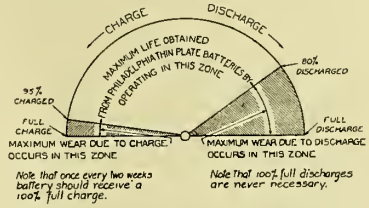



*Fig. 4—Diagram Illustrating How Oversize Capacity Insures Against Wear in Service.*

battery should not be overdischarged nor overcharged. The two factors tending to wear out a battery are gassing and the chemical combination of the active material with the acid of the electrolyte. Gassing is a product of charging; the combination of the active material with the electrolyte is the essence of discharging. Gassing represents waste. As long as the battery is capable of absorbing all the charging current no gas can be generated. It is only toward the end of a charge, when the amount of discharged material is small, that there is much danger of gassing. At the beginning of the charge the large amount of discharged active material in the plates enables the battery to take a very high rate of current without gassing. As the charge progresses the amount of discharged material decreases, and if the current rate is not reduced there may be more than can be absorbed, and the excess will be dissipated in producing gas. The gas bubbling out from the pores of the plates exerts a washing action on the active material and causes some of it to loosen from the plate and fall to the bottom of the cell. Here is where the "oversize" characteristic of the thin plate comes in. The nearer to a fully charged condition that a battery approaches the heavier the gassing. Fully one-half the wear due to gassing occurs during the last five or ten per cent of the charge. Therefore it is desirable to reduce to a minimum the amount of charging given a nearly fully charged battery. Since the capacity of a thin plate battery is greater than is usually needed, except for emergency, it is possible and desirable not to charge the battery fully, except once every week or two, but to bring it up ordinarily to say only 90 or 95 per cent full charge, thus eliminating on all but a few charges the last five or ten per cent of the charge which causes the greatest wear on the plates.

Just as wear due to charging becomes more pronounced the nearer a battery approaches a fully charged condition, so the wear due to discharging becomes more pronounced the nearer a battery reaches a fully discharged condition. Discharging tends to fill up the pores of a plate by the formation in the plate of lead sulphate. This is a perfectly normal condition. Lead sulphate is simply discharged active material. Unless lead sulphate forms there can be no discharge. Now lead sulphate occupies more space than did the charged active material, and it is a characteristic of a

well-designed plate that sufficient porosity has been provided within the plate to accommodate, without excessive strain, all the lead sulphate which forms on an ordinary discharge. It is inevitable, however, that discharging should cause some dislodgement of the active material. The more completely discharged a plate becomes the more the pores become filled with sulphate, the less space there is for the formation of more sulphate and the more likely it is that surface particles will be pushed off by the sulphate accumulating behind them and unable to find pore space in which to grow. It is just here that too hard plates fail. They have very little porosity. The amount of sulphate necessary to fill the pores is small, less than is likely to be produced on even a moderate discharge, consequently the strain imposed upon the plate by discharging is very great and either material will be dislodged or the plate will tend to buckle under the strain. Very hard, dense plates may be well adapted to withstand wear due to charging, but they are ill adapted to withstand much discharging.

Philadelphia thin plates are built to withstand discharging wear as well as charging wear. Porosity is not sacrificed to obtain maximum hardness. There are enough pores to accommodate all the sulphate which is formed during discharge, so that even under conditions of heavy discharge they wear slowly. But even this slow wear is greatly diminished by their "oversize" characteristic. To obtain all the mileage desired it is rarely necessary to discharge them to more than three-fourths of their full capacity. Experiments have shown that the life of the battery in days is greatly increased if it is seldom discharged to its maximum capacity. Maximum life in days and miles is obtained when a battery is regularly recharged after about 80 per cent of its capacity has been used. Charging before 80 per cent has been used increases the wear due to charging unless exceptional care is taken to eliminate gassing. Using more than 80 per cent of the capacity before recharging emphasizes the wear due to discharging. The "oversize" characteristic of the Philadelphia thin plate makes it possible to operate a Philadelphia thin plate battery on 90-95 per cent charges and 80 per cent discharges and thus obtain maximum life.

In carrying out this procedure it must not be forgotten that a full charge followed by an overcharge at a very low current rate is desirable once every week or two. The slight daily undercharging leaves in the plates a small amount of discharged material, which tends in time to harden to an undesirable extent. The weekly or bi-weekly overcharges convert this discharged material to charged material at regular intervals, thus periodically bringing the plates up to their maximum capacity and keeping the battery in the best operating condition. Complete information as to the details of operation will be found in the instruction book published by the Philadelphia Storage Battery Company.

The foregoing facts have an important bearing on the subject of boosting. In hard service, where great mileage is required, it is always better to boost than to discharge a battery to its fullest extent. The reason for this is not hard to perceive. Too full discharges cause excessive wear. Charging also causes wear, but there should be very little wear on a boost which follows the very simple instructions given in the booklet on "Boosting," issued by the Philadelphia Storage Battery Company. The current rates employed are high, it is true, but they come at a time when the battery is sufficiently discharged to stand high charging rates, and the boost is not continued up to the point of full charge, so that there should be very little, if any, gassing and, therefore, very little wear. Boosting causes a battery to work just where it works with least wear, namely, in between the extremes of full charge and full discharge. In heavy service boosting actually tends to increase the life of the battery and may be employed without hesitation.

To retard the wear on the plate, Philadelphia thin plate batteries are provided with finely perforated rubber sheets, which are placed against the positive plates. These sheets serve their purpose very well and the actual falling off from the plates of loosened material is greatly retarded. Attempts have been made at various time to extend this protection by further enclosing the positive plates, as by envelopes or otherwise, but these have proven unsatisfactory in that they do not greatly increase the life of the plates beyond that obtainable by the finely perforated sheets, and they do largely increase the cost, weight and space necessary for a given capacity, and entirely eliminate the important "oversize" characteristic.

Summing up, the economict advantages of Philadelphia thin plate batteries are three:—

1—They are "oversize" batteries.

2—Their price is moderate.

3—The cost of operation is low.

Due to their "oversize" they are prepared for any service, easy or hard. They meet equally well the moderate mileage of dull seasons and the greater mileage of rush times. They are able to cope with the increased demands imposed upon them by snow and bad roads without reduction of the usual route. They possess to the highest degree the quality of adapting themselves to the demands of the service.

The moderate price of Philadelphia thin plate batteries renders it unnecessary to tie up excessive amounts of capital in the transportation department, and the low operating cost reduces to a minimum the monthly expenses. The Philadelphia thin plate battery embodies to the highest degree the ability to meet the requirements of any service at the lowest possible cost.

## Boston Show Space Contracted For

Although the Boston Automobile show is two months hence, yet every inch of available space in the six acres of flooring of Mechanics Building has been contracted for, and there are scores of pleasure car, commercial motor vehicle, and accessory manufacturers and dealers who are clamoring for a chance to exhibit. Manager Chester I. Campbell is now considering the advisability of engaging an additional building to accommodate the overflow.

Boston is the only large city where trucks are exhibited. At the forthcoming show the entire lower floor will be occupied by truck displays. There are as many again who have made application for space. Manager Chester I. Campbell states that had he foreseen the extraordinary demand for space for commercial vehicles he would have had a separate show for them.

The space taken by the truck dealers has naturally crowded out a number of pleasure cars that heretofore have been shown in Boston. Even Paul Revere Hall, which in the past has been used exclusively for accessories has been taken for the display of pleasure cars.

# Development of the Ohio Electric

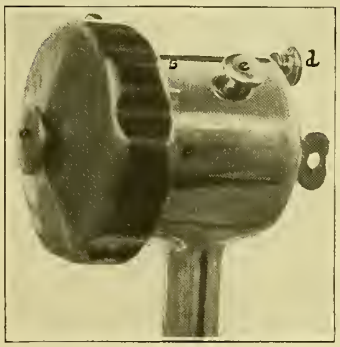
*Principles of Construction and Operation Developed from Early Models*

MORE and more motorists are coming to realize that it is only the electric car that combines the motoring requirements of the entire family to the utmost degree and in the most satisfactory way.

A good electric will make considerably more than the legal speed limit in city driving. It will carry one into the country and back much beyond the limits of the ordinary day's tour. It is more comfortable than any other type of vehicle, as well as more cleanly; it is the only car that a woman can drive without fear of damage to her garments; and it is the most economical car in upkeep and maintenance.

Women who have never driven a car before, find it easy to operate the electric after one short lesson. Nervous women are able to drive it in calm confidence. A child, even, cannot go wrong.

The absence of confusing control levers, the efficient braking system and the slight physical and mental effort required, combine to make the electric the "worryless car."



*Ohio Electric Magnetic Controller.*

The Ohio Electric Car Company of Teledo, one of the prominent manufacturers of high grade electrics, has done much in the development of the modern enclosed electric automobile.

This company is responsible for many of the improvements, especially in design and method of control, which have placed the electric upon such a high standard. In the past few years the engineers of this company have been instrumental in a general adoption by vehicle manufacturers of many valuable improvements in electric car construction.

Graceful curves in the design of light aluminum bodies; hard hammered fenders, of aluminum; exquisite upholstery; and many minor refinements have identified Ohio progress in development.

The well-known Ohio electric magnetic controller, with the various governing parts lettered, is shown in the accompanying illustration.

The small disc, fitting easily into the hand, is used instead of the usual control lever. Practically every operation of the car is governed by this disc. The disc is specially grooved, so that it is exceptionally easy to grasp. The letters indicate the various functions of the control as follows:

(a) Bell-button sounding distinct warning signal.

(b) Forward speeds, four in all. There is also an accelerator button located convenient to the foot, which adds an extra speed.

(c) Reverse speeds, three in all. Simply turning the disc forward or back adjusts the speeds as desired. The disc cannot be reversed without pressing the guard-button, which prevents the possibility of turning it the wrong way in an emergency.

(d) Controller lock-button. Push the button, and controller disc is locked, rendering car inoperative. Controller cannot be locked except in neutral position, thus preventing possible accidents which have occurred with other styles of controller mechanism. To start, replace the key, turn it, the button flies out, and you are ready to start. The door locks are operated by this same key.

(e) Magnetic brake. This will retard the car under all conditions, even while descending the steepest hill, and it is impossible to skid by using it. A simple pressure of the button accomplishes this result. So effective is this magnetic brake that the use of the emergency foot brake, also supplied, is minimized. When needed, the regular service foot brake is so carefully adjusted that a very slight pressure of the foot causes it to take hold at once with positive effect.

The simplicity and absolute dependability of this operating mechanism has been proven by six years' constant service.

There is also an automatic cut-out attached to the emergency foot-brake, by which the current is shut off as the pedal is pushed down; when brake is released the car is inoperative until the controller disc is returned to neutral position.

The steering post is equipped with ball bearings, which assures the handling of the car with the least possible effort.

Model 62, a late production, combines practically all of the developments in past models, with all aluminum body and hand hammered aluminum fenders.

When the Ohio Electric Car Company first produced the Vienese design it became necessary to produce a fender the design of which would harmonize with the style of the body and as it was impossible to secure an oval fender to conform to the perfect curves of the stream line body the company made templets of steel over which sheets of aluminum are hammered by hand into proper shape.

These fenders are absolutely seamless and are so attached to the car that they are noiseless as the patent leather fenders which were formerly used.

GENERAL SPECIFICATIONS OF MODEL 62.

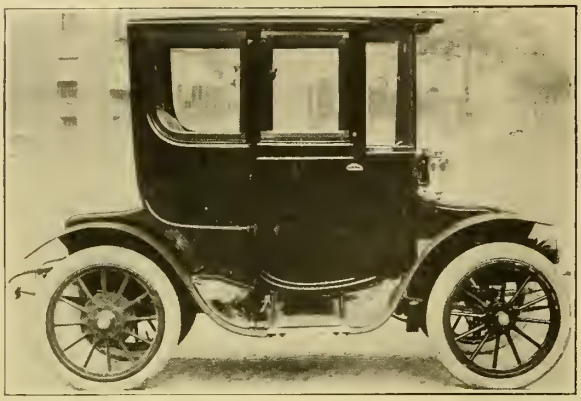
*The Principle*—Chainless, direct shaft drive without universal joints. A unit is formed by the motor, propeller shaft and rear axle. There are no concealed chains or gear reductions. All moving parts are enclosed in a dust-proof case and run in oil. Few parts, perfect lubrication, light weight. Worm drive or worm bevel drive is furnished at the option of the purchaser.

TRANSMISSION.

*The Motor*—The Ohio electric motor, specially designed, is noted for its wonderful overload capacity and exceptional hill-climbing ability. These features have been emphasized in the new models.

One of the ingenious features of this transmission is the fact that the torsion tube is supported between the motor and the rear axle at a point very near to the center of inertia. This puts all the weight of the above members on the frame of the car above the springs. The Ohio electric has reduced the total unsprung weight to practically the weight of the front wheels. The propeller shaft is nickel steel, torsion tube and main axle tube nickel steel, differential gears nickel steel, and springs vanadium steel, making an almost perfect combination for strength and efficiency.

*Brakes*—Two sets of independent mechanical brakes non-freezing type, operated on rear hub drums by foot



*Model D.*



*Model X.*

pedals; in addition to the magnetic brake mentioned above.

RUNNING GEAR AND BODY

*Frame*—The drop frame is of cold rolled pressed steel in channeled section. It is one gauge heavier and one-half inch wider than customarily used in electric cars. The front end of frame is offset so as to give short turning radius.

*Front Axle*—One piece, heavy drop forged I-beam. Spring saddles and yoke ends forged integral with the axle instead of being brazed to a tube. Steering knuckles strong drop forgings. The connecting rod is located behind the axle where it is guarded from all road obstructions. Ball and socket spring joints at each end act as shock absorbers and eliminate annoying vibration in the steering handle.

*Rear Axle*—Full floating type of latest design, the weight of the car being carried by the housing, as endorsed by the best automobile engineers.

*Spring Suspension*—Semi-elliptic front, three-quarter elliptic scroll in rear. The front ends of rear springs do away with radius rods, thereby simplifying the construction and eliminating weight and rattle.

*Lighting*—Lights are operated by a special, patented rotary switch. By means of this switch any combination of lights can be turned on. There is also the advantage of turning off the side light next the curb, and thereby preventing this light shining in the eyes of passersby.

Model D, the first Ohio electric, built in 1909, it is said, was the first electric car on the market with direct shaft drive without universal joints, a principle still maintained in the construction of the Ohio car. This car like every Ohio built since that time was equipped with magnetic control.

Model X, the first double drive electric constructed, was built in 1912, carried five passengers and could be driven from either the front or rear seat, as desired.

This style of construction soon became very popular as it made possible the comfortable accommodation of five passengers in an enclosed electric without obstructing the driver's view of the road ahead.

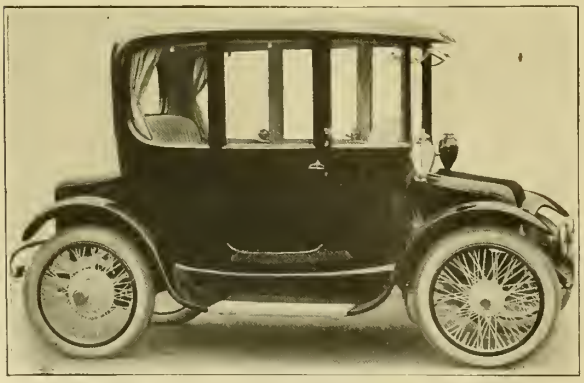
The interior of Model X is shown in the illustration and gives the seating arrangement of first double drive.

Building a car to be driven either from the front or rear seat required an entirely new interior arrangement and this car was built to accommodate three passengers on the rear seat and two in the forward chair seats which were built to revolve on pedestals so the passengers could be seated facing the occupants of the rear seat or facing in the direction in which the car was driven, as almost all enclosed electric cars are built today.

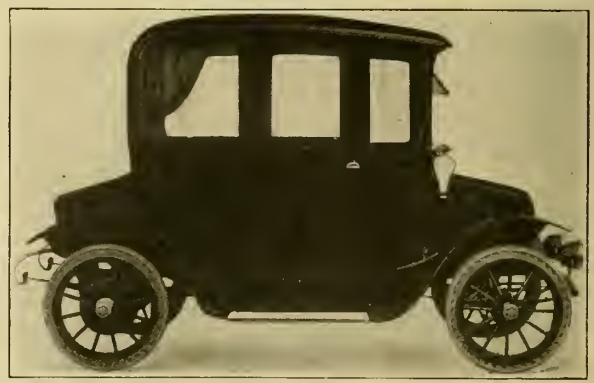
Model 41, the first stream line enclosed electric car was brought out by the Ohio Company late in 1914 and has been continued in all models up to the present time. The entire side of the car with the exception of the door is made of two unbroken aluminum panels. This not only does away with joints and mouldings but makes a very beautifully designed body which conforms to the present popular demand in enclosed car construction.

Model Y, built in 1913, was the first electric car of Vienese design, built in this country. This type of body with slight modifications has since become very popular in all high-grade enclosed cars.

The style was originated by a foreign manufacturer and the Ohio company built and marketed two models of this type in 1913 and has since developed the design into its present models.



*Model 67.*



*Model Y.*

# Progress of the Electric Passenger Automobile

*Developments in General Design, Construction and Materials*

IN the United States there are approximately thirty-five thousand passenger electric automobiles. The bulk of these have been built in the last six years, although there are many in operation which represent the first attempts of pioneer electric car manufacturers nearly sixteen years ago.

The first electric passenger cars can be described best as a combination of carriage building with street car construction. The rear axle had the wheels solidly fixed to it, and revolving as a whole. The motor was suspended from and geared to this revolving axle. A combination of this construction was brought out in several models, first, in a light runabout using a revolving axle with the motor suspended and geared the same as on street car construction, and later, a combination of this construction, viz., a solid rear axle with two motors bolted on, with one geared to each rear wheel. This construction proved very efficient, but as time went on it was found necessary to greatly strengthen the different parts in order to afford the required stand-up qualities under service. It was impossible, however, to gain silent operation from this construction.

Many great improvements have been made since the inception of these first models. Especially in the last year developments have brought about many changes in general design and mechanical construction, producing more graceful body lines, more convenient seating arrangements, luxurious interior decoration, and all of more lasting and endurable quality in materials.

The old style that was suggestive of a carriage without a horse has entirely disappeared. The new types are as distinctive as those of the modern gas cars. The 1916 models with their low, compact bodies hung rakishly, give an expression of power and speed that was entirely lacking in the spiderly models of the past. More spacious bodies introduced this year have been responsible for improvements in the seating arrangements, all of the new models having some variation in the "all front" idea.

The most prominent development has been made in reduced weight; the use of the worm bevel gear drive; horizontal control and steering lever; increased mileage because of improved batteries; brighter color schemes; more artistic upholstering; and a general reduction in price.

In 1900 early chain drive models appeared—one make having a runabout body equipped with a single chain drive to a revolving rear axle operated on pneumatic tires. Another manufacturer brought out a double side chain driven car operating on solid tires. The engineer responsible for the side chain driven car also brought out at this time a shaft drive car, which was, so far as is known, the first electric shaft drive car. This model was constructed with a slow-speed motor, connected through a double universal jointed propeller shaft to the rear axle, without chain or gear reduction, except the ordinary bevel gear reduction in the rear axle. The principles of this first shaft drive model laid down 15 years ago formed the basis of construction that is generally acknowledged today as the foremost standard of construction in the modern electric passenger car.

The success of these cars was by this time attracting others to the commercial possibilities of the electric vehicle, and several additional concerns took up the manufacture of passenger vehicles. The battery equipment varied from 10 to 40 cells and chain drive was used, with the exception of the one model already mentioned. Nearly all cars were built to use pneumatic tires and small batteries. From this period on to 1908 many experimental stages were passed through, the cars being turned out in moderate quantities and operating with considerable success.

In 1908 and 1909 the industry made its greatest gains. The chain drive construction gave way to the shaft drive, with its attendant simplicity and silence. During the experimental years the vehicle manufacturers were not alone in working out their problems, but the many allied interests were giving their full quota of time and study to the development work; particularly was this true of the manufacturers of motors, batteries, tires, bodies and electrical equipment.

In 1910 and 1911 the manufacturers of electric passenger cars first came to realize the advantages to be gained through co-operation with these same experts—the parts specialists—not only with respect to production facilities, but particularly from the standpoint of efficient standardization. The demand had outgrown the facilities and, in spite of the rapid increase in the business as a whole, no material gain had been made in raising the manufacturing efficiency or in commensurately lowering production costs. For that reason the prices on electric passenger cars remained where they started, while the manufacturers of gas cars were making tremendous strides through proper factory organization and parts specialists construction—both factors leading toward reasonble standardization and a consequent lowering of prices.

By 1912 electric passenger car manufacturers were forced to admit that, in order to keep up the pace, it would be imperative that they standardize and take into full consideration the manufacturing methods already adopted by their gas car brethren. The following demands had crystallized from their previous efforts: First, the demand for solid rubber tires (the use of which was confined exclusively to the electric on account of its structural simplicity), which one engineer had used for 12 years. He proved conclusively that it was feasible and practical to operate the electric vehicle on solid tires provided the proper construction was used. The next demand was for a greater radius of action and increased speed. This brought the leading manufacturers, who had used from 20 to 24, 28, 36 and 38 cell equipments, to a general use of not less than 40 cells. Another demand was body construction affording greater passenger capacity, which brought out the wide rear seats, affording ample room for three persons, with extra revolving seats for two additional passengers. The fourth major demand was a control equipment that simplified the operation of the car and provided safeguards against improper handling. The steps employed in perfecting the vehicles to meet these demands, as well as the many additional requirements that have since developed, brings us to the modern construction used in the electric passenger car of today.

PRESENT TYPE OF CONSTRUCTION

The electric passenger vehicle has been, to a large extent, responsible for the high degree of perfection attained in the heat treatment of steel, for it was on electric vehicles that heat-treated steel was first used in automobile construction. This was due primarily to those cars using solid tires, a practice which necessitated the development of better materials throughout in order to withstand and absorb increased vibrations. The general mechanical construction of the cars today employs, to a great extent, the use of heat-treated special formula steel.

This use of better steels has permitted a decrease in the amount of material necessary which is responsible for a great decrease in total weight of nearly 25 per cent. It not only makes the vehicle easier to control, but makes possible a 20 per cent increase in mileage and a much greater speed. Where the average mileage on a single charge was from 50 to 70 miles and an average speed of 18 to 22 miles per hour, the new models are capable of securing from 15 to 25 miles more on a charge and at a speed of 25 to 27 miles per hour. Roadster models are capable of making from 100 to 110 miles on a charge at a maximum speed of 35 miles per hour.

Reduced weight has been secured without eliminating anything which might reduce the substantiality of the vehicles. In fact lighter but stronger materials have replaced the heavier steels and woods used in chasses and bodies. Experts and large appropriations of money have been exhausted in experimental work to secure a chassis and body light in weight but rapid and tensile in strength to withstand all shock.

CHASSIS FRAME

The steel chassis frame is built up into an extremely rigid unit; with scientific distribution of metal, using an average of from six to eight cross channel reinforcements, integrally gusseted, completing a rigid foundation of extreme strength, particularly adapted to the use of solid rubber tires. The frames are now being constructed to make it unnecessary to lift the batteries over obstructing end channels in removing, and the front ends are narrowed to permit an extremely short turning radius.

AXLES

Practically all manufacturers now use the I-beam type of front axle and a one-piece steel housing type of rear axle.

BEARINGS

Timken roller bearings are being favored as the proper bearing mountings for axles and wheels. S.K.F. self-aligning ball bearings are fast gaining favor for use in the steering parts.

MOTOR

The slow-speed type of motor has been adopted by the majority of manufacturers. In general, this motor conforms to the following specifications: 800 to 900 r.p.m. at 80 volts and 28 amperes, 4 pole series type, unsaturated, generally designed so the frame will take two windings—60 or 80 volts—to be used principally with 60 cell Edison or 40 cell lead batteries, respectively. These windings are proportioned so they deliver equal horsepower at their respective ratings; in other words, the two windings are proportioned so that they have equal watt ratings at the same torque and the same speed. This construction facilitates the changing of the motor from one type of battery to the other without change in the motor suspension or mechanical transmission system.

The motors are designed so as to secure strength with a simple arrangement of few parts. Considering the service that is demanded from the modern electric passenger car, it is remarkable how little attention these motors require. While most vehicle motors are periodically inspected, it is known that many have covered from eight months to over a year's continuous service without attention of any sort. Such attention as is necessary is generally confined to renewing of worn brushes and replenishing the bearing lubricant. The motors are proportioned so as to commutate sparklessly and maintain a high polish on the commutator, even when operating under the severe service required in hilly towns or adverse weather and road conditions, where the motors are required to commutate from five to six and even more times the normal rated current.

The majority of manufacturers have found it necessary to install in general heavier windings than would be normally required, in order that all hill conditions can be satisfactorily met. The wide-awake manufacturers will meet these requirements more efficiently in the near future by using standard motor frames with different windings to meet the various duties.

The ordinary performance specifications as to temperature runs as follows: After a continuous run (for four hours) at the specified voltage and current, no part of the windings will exceed a temperature of 50 degrees C. above the surrounding air. Test to be made on stand with motor covers removed. Temperatures are to be measured by thermometer. All motors are mounted on ball bearings. The bearing housings constructed so the lubricant cannot work into the motors and are designed to catch any oil that may work by the barriers. The range of weight of motors in this service runs from 235 to 300 pounds. When full consideration is given the duty these motors are called upon to perform, viz., to drive a vehicle weighing without occupants an average of 3600 to 4000 pounds at a rate of 20 to 22 miles per hour, their extreme high efficiency is remarkable, a characteristic which is especially pronounced when operating under extreme overload.

Operating data taken from a late model electric passenger car is given in Table I. This car had been in concontinuous service and received no special tuning up. This particular test is one of many similar records that have made equally as favorable a showing. It will be seen that the vehicle motor development brought about by the modern electric passenger car has reached a very high stage of perfection. Practically all motors are mounted on a substantial sub-frame in the center of the chassis. In this position they are well protected from direct road shocks.

TRANSMISSION

The power is transmitted through a double universal-jointed propeller shaft to the rear axle through one set of worm bevel gears. The worm bevel or spiral bevel gear is given the preference over the worm as standard equipment for the following reasons:—In the first place, practice has proven that it will give considerable higher average efficiency. The recent announcements of several leading manufacturers show that they are adopting this type of gear in preference to the worm. While the characteristics of both gears are practically the same as to silent operation, the higher efficiency of the worm bevel alone is ample reason for its preference, particularly on the electric.

The rear axle is held in alignment by the lower halves of the rear springs, and the torque stress is taken up by a torsion rod, which is fastened permanently to the rear axle, with the exception of being free to move at right angles to the plane of the torque. The front end of this torsion rod is suspended between two coil springs, which serves to remove some of the stress from

TABLE I—OPERATING DATA

| Speed | | Weight | | Power | | | Per Ton-Mile | | |
|---|---|---|---|---|---|---|---|---|---|
| Cont'ler | speed | Car | Pas. | Volts | Amps. | Watts | Watts | Rate | Cost |
| 1st | 5 miles..... | 3675 | 325 | 40 | 8 | 320 | 32 | 5c | $0.0016 |
| 2d | 8 miles..... | 3675 | 325 | 40 | 10 | 400 | 25 | 5c | 0.00125 |
| 3d | 12 miles..... | 3675 | 325 | 80 | 20 | 1600 | 66 | 5c | 0.0033 |
| 4th | 18 miles..... | 3675 | 325 | 80 | 25 | 2000 | 55 | 5c | 0.00275 |
| 5th | 22 miles..... | 3675 | 325 | 80 | 35 | 2800 | 64 | 5c | 0.032 |

the rod and to eliminate noise. In order to permit two points of contact on the rear axle and consequent greater strength to leverage the torsion rod is of the "\" shape design.

CONTROLLER

The tendency on the majority of electric passenger cars today is to locate the controller as close to the motor as frame construction will permit, thus materially cutting down the length of the wiring and making the controller and motor both accessible from the same inspection door. The five-speed forward and reverse drum-type controller is used by practically all electric vehicle manufacturers. Some engineers prefer to have the batteries connected in series on all speeds, but the series-parallel connection with the elimination of resistance speeds is now the most widely used form. The best practice incorporates a bridging coil between second and third speeds to eliminate the shock and usual arc, due to changing from 40 to 80 volts. The best construction is to use wiring no smaller than No. 4 for the main circuits.

The old practice of using the knife switch for reversing has been discarded for the more general use of the separate, or reversing drum, which may or may not be on the main controller shaft. Although the action of reversing on the controller proper is uniform on all makes of electric vehicles, the method of throwing the reversing drum is essentially different. On one type, the reversing drum is not operated on the main controller shaft, but is independent of the main controller drum and a foot pedal or floor push located near the floor on the heel board is used for throwing this drum. On other makes of electric passenger cars the reverser control is incorporated in the controller handle, on a separate lever, and sometimes even on the brake pedal itself.

There is used in connection with this main controller drum a simple mechanical device that governs the operation of the reversing drum, whose use makes it possible to cut off all power without moving the controller handle and renders it impossible to throw the reverse drum while the car is in motion or while the controller is in speed position. The majority of electric passenger cars incorporate what is termed an electric cut-out in connection with the foot brake, which is generally arranged to operate through the reverse drum in the controller. When the foot brake is set the reverse drum is automatically thrown to a neutral position, thus cutting all connection between the controller and the motor. This safety feature makes it impossible to set the brakes without cutting off the power. Likewise it is impossible to apply power or start the car until the brakes are released.

Several other improvements are now incorporated in the controller proper, viz., a magnetic blow-out to eliminate or take up as much of the arcing as possible and a self-lubricating wipe system for the contacts. All controllers are protected from dirt and dust by metal housings.

OPERATION

With a few exceptions, all electric passenger cars are now operated by the horizontal control lever. Most of the manufacturers are now operating a mechanical or electrical motor brake through this same control lever so that all power is applied, cut off and the brakes operated through the one lever and the entire system secured by a Yale lock upon leaving the car. In addition to the hand brake, all cars are equipped with dependable foot brakes operating on both rear hubs.

A study of the general construction shows that the electric passenger car is making very good progress toward standardization. Outside of minor refinements, the general construction of all leading makes have remained basically the same for the past three years. The engineering has been devoted to improved efficiency throughout, increased accessibility of all parts and better lubrication.

MAINTENANCE DATA

The data on actual operating costs given in Table II has been carefuly compiled by a leading manufacturer. The figures are not based on ideal cases, but give as fair a general average as can be compiled on the total maintenance of the electric passenger car of today. The following notes will serve as a guide on the basis for many of the figures given:—

*Insurance*—Includes full coverage on public personal injury, property damage, damage to car, fire and theft.

*Tires*—Figured on basis of using Firestone Special Electric, 36 by 4½ inches, guaranteed for 10,000 miles.

*Paint*—Complete burn-off.

*Overhaul*—Figures obtained from service records, where all work is done on cars.

*Garage*—Thirty-five dollars per month, which covers charging, washing, polishing, deliveries and storage.

*Batteries*—Complete renewal, carrying guarantee of 12,000 miles, including wash job and incidental repairs. On rental batteries, charge of $16 per month.

LEAD BATTERIES

The standard lead battery equipment is 42 calls of 11, 13 or 15 high-capacity plates per cell. The tendency seems to favor the use of thinner plates and more of them; 15 plates are furnished as standard more frequently than any lesser number. This equipment will give 180 ampere-hours, and in most cases develops a full 200. There are two reasons for the adoption of the thin-plate lead battery:—1,—the growing demand for increased speed and mileage; 2,—the discovery on the manufacturers' part that the life of the thin-plate battery is equal in every respect to that of the heavier plates. One standard size of jar is now being used that will take from 11 to 15 plates. The high-ribbed type of jar is used, having at least a three-inch sediment space, which eliminates frequent battery washing. The assembly of jars in trays is side to side with a single row per tray, with the surface of the plates set at right angles to the direction of motion and the trays set in the battery compartments lengthwise. This arrangement is favored on account of its compactness and accessibility and reduction of jar breakages.

EDISON BATTERIES

Recent developments in the Edison alkaline storage battery hold forth great possibilities for the electric passenger car. Edison batteries have developed a great field among the electric commercial cars, their installations for this work showing a very pronounced increase. The electric passenger car requirements differ in some respects, and to best meet these demands the new "G" type of Edison cell has been recently developed for electric passenger car service. The standard Edison equipment is 60 "G-7" type cells, which gives a normal rating of 175 ampere-hours and develops an average of 2.25. In addition to the general advant-

TABLE II—MAINTENANCE OF ELECTRIC CARS.

WHEN KEPT IN A PUBLIC GARAGE.

Based on 12,000 Miles Per Year

| | Electric | Extra Cost of Gas Car |
|---|---|---|
| Insurance $2,000.00 | $ 135.00 | 11 |
| Tires | 250.32 | 100 |
| Paint | 125.00 | 20 |
| Garage | 420.00 | –29* |
| Overhaul, etc. | 75.00 | 366 |
| Batteries and battery incidentals | 350.00 | ... |
| Total | $1,355.32 | 27 |
| WITH RENTAL BATTERIES | | |
| Batteries | $ 192.00 | 37 |
| | $1,197.32 | 44 |

WHEN KEPT IN PRIVATE GARAGE

While no allowance has been made for cost of space or rent, and such items as flushing, washing and polishing, it is only fair to state that these items should be considered under private garage, for all these items are included in cost under public garage.

| | Electric | Extra Cost of Gas Car |
|---|---|---|
| Insurance $2,000.00 | $ 135.00 | 11 |
| Tires | 250.32 | 100 |
| Paint | 125.00 | 20 |
| Overhaul, etc. | 75.00 | 366 |
| Batteries | 350.00 | ... |
| Current | 144.00 | ... |
| Total | $1,079.32 | 32 |
| WITH RENTAL BATTERIES | | |
| Battery | $ 192.00 | ... |
| Total | $ 921.32 | 55 |

(Current based on flat rate of 0.055 per kw. hr.)

WHEN KEPT IN A PRIVATE GARAGE.

Based on 6,000 Miles per Year

| | | |
|---|---|---|
| Total | $ 669.66 | 29 |

*Difference in favor of gas car. This includes the cost of charging the electric car, but does not cover gasoline or oil for the gas car.

Note.—For those who want comparative percentages of gas cars with electrics, a column entitled "Saving in percent over gas cars" has been added. The figures upon which the gas car percentages are figured were obtained from various repair shops, garages and private owners and represent a fair general average. As in the case of the data on electrics, liberal allowances have been made, as, for example, on paint, where figures are based not on an ordinary revarnish or $75 paint job, but on the best job procurable, viz., a complete burn-off.

Inasmuch as a chauffeur is necessary with the majority of gas cars to give the same full service as an electric, the following figures apply. Both cars kept in public garage and gas car run by chauffeur, using same figures as before on other items.

| | | *Extra Cost of Gas Car* |
|---|---|---|
| Total upkeep for electric | $1,355.32 | 116 |
| WITH RENTAL BATTERY. | | |
| Total upkeep | 1,197.32 | 144 |
| Both cars kept in private carage and gas car run by chauffeur: | | |
| Total upkeep | $1,079.32 | 143 |
| WITH RENTAL BATTERY. | | |
| Total upkeep | 421.32 | 185 |

TABLE III—COST OF OPERATING ELECTRIC CAR ON COST-PER-MILE BASIS.

| Garage-Privte. Battery Bought. | 6,000 Miles per annum | 12,000 Miles per annum |
|---|---|---|
| Tires | $0.02086 | $0.02086 |
| Overhaul, etc. | 0.00625 | 0.00625 |
| Batteries | 0.0291 | 0.0291 |
| Current | 0.012 | 0.012 |
| Total | $0.06821 | $0.06821 |
| With Rental Battery | $0.032 | $0.016 |
| Total | $0.07111 | $0.05511 |
| Garage-Public. Battery-Bought | $0.0291 | $0.0291 |
| Total | $0.12621 | $0.09121 |
| With Rental Battery | $0.032 | $0.016 |
| Total | $0.12911 | $0.07811 |

ages of the Edison cell, the following improvements are offered in the new "G" type cell:—The internal resistance has been cut down approximately 50 per cent. For that reason the "G" type is considerably less affected by temperature changes, in addition to permitting a considerable lower average rate of charge.

SUMMARY

A review and analysis of the late electric passenger car clearly indicates that the experimental stage is long past; the old carriage idea, the woman's toy, etc., has grown into a scientifically designed electrical and mechanical masterpiece. The most careful attention that modern engineering science can give has developed a car that meets most completely all the requirements of the finest motor car, with greatest economy, efficiency and comfort.

Safety is synonymous with the electric car, and ingenious engineering has developed the safety factor on the modern electric to the highest degree. The electric car has won first position in the public's esteem for ultra refinement, serviceability and economy.

Haphazard manufacturing methods have disappeared before highly efficient, specialized production. Standardization and specialization have been responsible for the reduction in price, averaging nearly 25 percent in the past two years. At the same time the quality of the cars in design, material, workmanship and refinements has risen at least a like percentage.

It is most reasonable to assume that this combination of important factors will bring a much more rapid expansion in the electric car industry which should double the number of electric passenger cars in operation in the next five years.

## Electric Taxicabs for New York

During the next week officials of the Detroit Taxicab & Transfer Company, now manufacturing and operating electric taxicabs in Detroit, will visit the East for the purpose of financing a new company to operate electric taxicabs in New York City. August Smith is president of the Detroit company and I. S. Scrimger is the secretary-treasurer and general manager.

One of the Detroit fleet of forty-seven cars has been in New York since the first of December and has been tested by all of the principal hotels, restaurants, clubs and other large users of taxicab service. The results show the electric taxicab to be acceptable to the New York public and further that it will operate successfully under the conditions of New York traffic. According to the present plans, the operation of the New York service will begin some time in July with a fleet of more than 150 cars.

The new company to be formed in New York is the first step toward the formation of similar companies in other large cities in the United States. It is also expected that a holding company will be formed to control the separate operating companies.

It is expected that, owing to the high price of gasoline, which is now well above 20 cents a gallon and is expected to go much higher, and the decreasing price of electric energy, electric taxicabs will be able to compete more than successfully with gasoline machines.

Editors: EDWARD J. MOCK, PAUL H. WOODRUFF
Advertising Manager: FRED B. SCHAFER
Circulation Manager: N. S. STRONGE
CHARLES R. CONDON: New York Representative
New York Office, 1022 Longacre Building
Forty-second St. and Broadway
Telephone Bryant 7030

*This publication is free and independent of all business or house connections or control. No manufacturer or supply dealer, or their stockholders or representatives, have any financial interest in Electric Vehicles or any voice in its management or policy.*

Entered at Chicago Post Office as Second Class Mail Matter

# ELECTRIC VEHICLES

PUBLISHED MONTHLY BY
ELECTRICITY MAGAZINE CORPORATION
Monadnock Building, Chicago
TELEPHONE: HARRISON 3014.

New York Office, 1022 Longacre Building, 42nd Street and Broadway.

Ed. J. Mock and Paul H. Woodruff, Editors
FRED B. SCHAFER, Advertising Manager.

NOTICE TO ADVERTISERS

Changes of advertising copy should reach the office of publication not less than ten days in advance of date of issue. Regular date of issue, first day of each month. New advertisements will be accepted up to within five days of date of issue, but proof of such advertisements cannot be shown in advance of publication.

SUBSCRIPTION PRICE
Per Year $1.50

| | |
|---|---|
| Canada | $1.75 |
| Foreign | 2.00 |
| Single Copy | .15 |

FOR SALE AT ALL NEWS STANDS

NOTICE TO SUBSCRIBERS

REMITTANCES — Remittances should be made by check, New York draft or money order, in favor of ELECTRIC VEHICLES. Foreign subscriptions may be remitted direct by International Postal Money Order.

CHANGE OF ADDRESS—The old address should be given as well as the new, and notice should be received two weeks in advance of the desired change.

If Your News Dealer Will Not Supply You—Please Notify Us

Volume VIII CHICAGO, JANUARY 1916 Number 1

## The National Automobile Shows

THE national automobile shows are about to be staged in many of our larger cities with especial prominence in New York and Chicago.

Centered around these widely heralded events there is a high fever of enthusiasm. Thousands of spectators are anxiously awaiting the opportunity to see assembled together the latest results of expert automobile manufacture. Thousands of visitors will inspect, study and probably decide on the purchase of their selected favorites. Other thousands will enjoy delightful indecision as to whether they should keep their cars for another year, or trade them in for the newer models with their many additional developments and conveniences.

At any rate there will be thousands of prospects—and every last one of them interested—prepared and there for the purpose of buying. They will all be motorists; either they already own a car or expect to own a car soon, or hope before long to get enough money to buy a car.

This mass of onlookers, then, represents a choice clientele of prospects—an audience of more than probable purchasers which could not be drawn together in such a promising frame of mind by any other method.

These events are advantageous for the same reason that automobile and piano dealers establish themselves along a "row." Why? For the one purpose of giving the public an opportunity to know just where to see all models of all makes in the shortest possible time and with the least effort, combining attractions to draw a greater total of visitors.

The automobile shows are merely automobile rows, more compact, more convenient and affording greater opportunity of education with less of the keen and sometimes noisome sales talk which causes many to avoid the regular display rooms.

Competition, it is true, is present a hundred per cent strong. Still a good product, meritorious and deserving, well exploited and a fair purchase at its list price, need not fear much from this source. Even though competitors' models are on display, the best product must triumph, for this is an age of educative purchasing on facts, and not on clever sales talk by a good "deal closer."

To electric car manufacturers, the automobile shows are the year's greatest opportunity. The very fact that the gas cars attract such multitudes of people is exceedingly valuable, because each year shows a better per cent of the patronage devoting their attention to the battery propelled vehicle.

The public has ample chance to see, to learn and to become attracted to this type. Many who visit the annual events with the sole purpose of choosing a gas car, follow the crowd into the electric automobile section of the exhibits and become converted to a type which is an asset in satisfaction and economy, rather than a liability in expense for repairs and upkeep.

If not a single electric were sold on the floor of either of our great national shows, the interest aroused, the enthusiasm displayed, the actual prospects secured, would earn the investment of the exhibit. However, it is a well-known fact that representatives do actually close many sales, some finding it necessary to sell their show models.

The 1916 shows will be the greatest ever staged. The public becomes more interested every year. There are no skeptics as in past years. Every one is an automobile fan, and a chance for serious investigation of the electric will make many new supporters of the correct method —the electrical way.

## The Natural Motive Power

GASOLINE! Spirit of progress and essence of joy! In the span of a few short years how has thy planet risen—and also thy price! More precious than jewels thy scintillating dew-drops, evaporating and stealing away like the ghost of a Wall street banker. In sordid gallons thy measure is taken in thy zinc-lined cell, but thou fleetest hence with every sob of thy engine, and presently thou art gone, together with four dollars and twenty cents.

And now they talk of substituting benzol—not that its price is less, but that its pep is more. Twenty-five cents a gallon; four gallons for a dollar. Add lubricating oil quantum suf., a dash of anti-freeze mixture, and some new dry cells. Oh, leave the blame thing in the garage; maybe some sucker will come along and buy it.

Get an electric; it's the only reasonable answer, so quit arguing. You know it looks better and runs better and makes you feel better. Electricity is ten cents a kilowatt-hour—lots of places less. It used to be twelve. Before that it used to be fifteen. Before long it will probably be seven. Some day it will be four.

They can't ship the supply of electricity to England or Germany. Nobody can corner it. It can't run short. You can buy it everywhere, and there's only one quality.

Electricity is the natural motive power; gasoline the unnatural. You doubt that? Tell us: What, besides automobiles, is driven by gasoline power? A few small machine shops and a million farmers' pumps, churns and cream separators. Nothing more of consequence, really. But electricity drives everything—even those deadly Prussian submarines. It drives the world.

Keep up your enthusiasm, you fellows whose ambitions for big business are always postponed for another year. The day will come—and remember that we said it!—when ALL the cars on the street will be electrics.

## A Department Exclusively for Electric Garagemen

THE constantly increasing adoption of the electric vehicle has had considerable effect on the allied electric garage industry. As the sale of electrics increased, new charging stations and garages were necessary in order to properly care for the vehicles. In all parts of the United States, especially in our large cities, these stations have been established, some catering exclusively to the electric, others equipped to serve the electric in conjunction with gas cars.

Garage owners soon learned that this new branch of the garage business furnished many problems and necessitated considerable study. Charging of batteries, adjustment of motors and controllers, washing, lubricating, accounting systems, "hiker" methods, etc., were new duties in which many were inexperienced. Data on these subjects has been difficult to obtain. Garagemen have appealed to many sources for such information. Few publications have touched on these matters comprehensively.

In view of assisting garagemen, ELECTRIC VEHICLES will publish a garage department in which articles by well known authorities will present all available data on matters pertaining to the garaging of the electric automobile.

This department will appear in each number beginning in the February issue. Questions, new ideas, suggestions, methods, or experiences of actual operation, etc., will be gladly accepted by the editors for solution. The columns of this department will be open to discussion from our readers and any problems or inquiries will be analyzed by experts and published comprehensively.

ELECTRIC VEHICLES will probably be the only publication in existence devoting a department exclusively to electric garaging. To the electric garageman it presents an excellent opportunity to systematize and improve methods generally.

# Comparative Operating Data

*Expense of Operating and Garaging an Electric and Gasoline Car*

NOW that the automobile shows are approaching, people are beginning to think of the type of car they will purchase for the coming year. It will be interesting to prospective buyers to note the difference in expense of operating and garaging an electric and gasoline car. The following is some comparative operating data on the cost of operating a gasoline car of the same valuation as a high grade electric:

| | Gas | Electric | Saving of Electric Over Gas Car in Per Cent |
|---|---|---|---|
| Insurance | $ 150.00 | $ 135.00 | 11 |
| Tires | 512.16 | 250.32 | 100 |
| Paint | 150.00 | 125.00 | 20 |
| Garage | 300.00 | 420.00 | *29 |
| Overhaul, etc. | 350.00 | 75.00 | 366 |
| Oil | 24.00 | | |
| Gasoline | 240.00 | | |
| Batteries and battery incidentals | | 360.00 | *24 |
| Total | $1,726.16 | $1,355.32 | 27 |

Insurance includes full coverage on public and personal injury, property damage, damage to car, fire and theft. Tires are figured on a basis of using 36x4½ pneumatics, guaranteed for 5,000 miles, and special electric cushion tires, 36x4½, guaranteed for 10,000 miles. Paint, including complete burn-off, shows a difference in price because of difference in size of cars. Overhaul on gas car approximate figures obtained from various repair shops and garages. On the electric the above figures were obtained from service records. Garage for gas car, $25 per month; electric, $35 per month, without chauffeur. Oil expense was figured on using one gallon to 400 miles at 80 cents per gallon. Gasoline was figured on using one gallon to 7 miles at 14 cents per gallon. Batteries include a complete renewal carrying guarantee of 12,000 miles. Including wash job and incidental repairs.

WITH RENTAL BATTERY.

| | Gas | Electric | Per Cent |
|---|---|---|---|
| Batteries (Oil and gas) | | $ 192.00 | 37 |
| Total | $1,726.16 | 1,197.32 | 44 |

Batteries—Rental charge of $16 per month.

It will be noted that reference is made to the battery rental and the particular company responsible for these figures has also inaugurated the battery rental system as applied to the passenger type of electric vehicle. This system enables a purchaser to buy the car without batteries, renting them from an electric garage, and thereby assuring himself of batteries which are always maintained in excellent condition. The increased economy effected by this system as shown in the report is interesting.

The following data is given for cars kept in private garages and operated without a chauffeur.

| | Gas | Electric | Per Cent of Saving |
|---|---|---|---|
| Insurance $2,000 | $150.00 | $135.00 | 11 |
| Tires | 256.08 | 125.16 | 100 |
| Paint | 150.00 | 125.00 | 20 |
| Overhaul, etc. | 175.00 | 37.50 | 366 |
| Oil | 12.00 | | |
| Gasoline | 120.00 | | |
| Batteries | | 175.00 | |
| Current | | 72.00 | *46 |
| Total | $863.08 | $669.66 | 29 |

Figures based on mileage of 6,000 miles per year.

WITH RENTAL BATTERY.

| | | | |
|---|---|---|---|
| Battery | (Oil and gas) | $192.00 | |
| Current | | 72.00 | *50 |
| Total | $863.08 | $686.66 | 26 |

Under the same conditions of privately owned garage, without chauffeur, and with the figures based on 12,000 miles per year and current based on a flat rate of $.055 per kilowatt hour, the following table results:

| | Gas | Electric | Per Cent |
|---|---|---|---|
| Insurance | $ 150.00 | $ 135.00 | 11 |
| Tires | 512.16 | 250.32 | 100 |
| Paint | 150.00 | 125.00 | 20 |
| Overhaul, etc. | 350.00 | 75.00 | 366 |
| Oil | 24.00 | | |
| Gasoline | 240.00 | | |
| Batteries | | 350.00 | |
| Current | | 144.00 | *46 |
| Total | $1,426.16 | $1,079.32 | 32 |

Current—Based on flat rate of $.055 per kwh.
Above figures based on 12,000 miles per year.

WITH RENTAL BATTERY.

| | | | |
|---|---|---|---|
| Battery | (Gasoline) | $192.00 | |
| | Oil | 144.00 | *21 |
| Total | $1,426.16 | $921.32 | 55 |

The electric, or the "chauffeurless car," as some call it, shows the remarkable saving of 116 per cent in operating expenses over a gas car in instances where the owner is accustomed to employing a driver. The electric requires no chauffeur, it is simple enough for anyone to operate and the fewness of mechanical parts warrants only a minimum amount of expert attention. The following table shows the comparative operating costs when both cars are kept in a public garage and gas car run by a chauffeur:

| | Gas | Electric | Per Cent |
|---|---|---|---|
| Insurance $2,000 | $ 150.00 | $ 135.00 | 11 |
| Tires | 512.16 | 230.32 | 100 |
| Paint | 150.00 | 125.00 | 20 |
| Overhaul, etc. | 350.00 | 75.00 | 366 |
| Garage | 300.00 | 420.00 | *29 |
| Oil | 24.00 | | |
| Gasoline | 240.00 | | |
| Battery | | 350.00 | *24 |
| Chauffeur | 1,200.00 | | |
| Total | $2,926.16 | $1,355.32 | 116 |

WITH RENTAL BATTERY.

| | | | |
|---|---|---|---|
| Battery | Oil and gas | $ 192.00 | 37 |
| Total | $2,926.16 | $1,197.32 | 144 |

The following set of figures are estimates of expenses when cars are kept in private garages with gas car run by chauffeur:

| | Gas | Electric | Per Cent |
|---|---|---|---|
| Insurance $2,000 | $ 150.00 | $ 135.00 | 11 |
| Tires | 512.16 | 250.32 | 100 |
| Paint | 150.00 | 125.00 | 20 |
| Overhaul, etc. | 350.00 | 75.00 | 366 |
| Oil | 24.00 | | |
| Gasoline | 240.00 | | |
| Batteries | | 350.00 | *46 |
| Current | | 144.00 | *46 |
| Chauffeur | 1,200.00 | | |
| Total | $2,626.16 | $1,079.32 | 143 |

Wages of chauffeur, $100 per month.

Percentage of difference on battery and current offsets oil and gasoline, since both perform same function for respective cars.

WITH RENTAL BATTERY

| | | | |
|---|---|---|---|
| Battery | Gasoline | $ 192.00 | *21 |
| Current | Oil | 144.00 | |
| Total | $2,626.16 | $ 931.32 | 185 |

COST OF OPERATING ELECTRIC CAR ON COST-PER-MILE BASIS

| | 6,000 mi. per yr. | 12,000 mi. per yr. |
|---|---|---|
| Garage—Private | | |
| Battery—Bought | | |
| Tires | $0.02086 | $0.02086 |
| Overhaul, etc. | .00625 | .00625 |
| Batteries | .0291 | .0291 |
| Current | .012 | $0.06821 |
| Total | $0.06821 | $0.06821 |
| Garage—Private | | |
| Battery—Rented | | |
| Tires | $0.02086 | $0.02086 |
| Overhaul, etc. | .00625 | .00625 |
| Batteries | .032 | .016 |
| Current | .012 | .012 |
| Total | $0.07111 | $0.05511 |
| Garage—Public | | |
| Battery—Bought | | |
| Tires | $0.02086 | $0.02086 |
| Overhaul, etc. | .00625 | .00625 |
| Garage | .07 | .035 |
| Batteries | .0291 | .0291 |
| Total | $0.12621 | $0.09121 |
| Garage—Public | | |
| Battery—Rented | | |
| Tires | $0.02086 | $0.02086 |
| Overhaul, etc. | .00625 | .00625 |
| Garage | .07 | .035 |
| Battery | .032 | .016 |
| Total | $0.12911 | $0.07811 |

These figures are supplied by a manufacturer of electric passenger vehicles, and a careful study will reveal the remarkable economy in the operation of the electric. In the purchase of an automobile something more than initial cost should be considered, for as a matter of fact the operating costs, by virtue of their size, are of the chief consideration. Frequently, persons without experience will invest their money in automobiles without a sufficient income to maintain them afterwards, and the operation expenses become a severe tax on their resources. Therefore, the uninitiated purchaser should make a thorough study of his needs, and consider all of the detailed expenses which follow the first cost of a car. An electric fulfills 98 per cent of all the requirements of the average family living in city, town or suburb, and its economy, simplicity of operation, dependability and safety recommend it as an ideal family car.

## One Wheel Electric Tractor

In view of converting horse-drawn wagons into modern self-propelled electric trucks, a Chicago manufacturer has perfected a one-wheel arrangement which with the assistance of an electric storage battery produces a very practical electric truck.

The attachment consists of a single wheel in which is located a motor. The motor has a pinion at the end of the armature shaft which engages a gear attached to the interior rim of the wheel. The electric current passing from the storage battery through the motor causes the revolution of the traction wheel which pulls the vehicle. The motor being hung within the wheel, is completely protected from dirt, weather, and consequently permits a maximum in efficiency in operation.

In the average motor truck where either a shaft or chains are employed, exposure to dirt, lubrication, etc., causes a great loss of efficiency. In this attachment it is claimed that less than 7 per cent is lost in transmission.

Simplicity is the principal factor. There are no parts to get out of alignment; the cost of manufacture is low, and the operation is easy and practically noiseless.

The wheel itself is constructed of cast steel and equipped with a 3½-inch dual tire of the truck type. The motor is a standard type and the pinion and the gear are steel castings. Both sides of the wheel can be removed when adjusting, lubricating or repairing are necessary. An accessible slot permits ample opportunity for inspection.

Steering is secured by means of the wheel method which operates a pinion engaging in a gear arranged on a circular frame. As the wheel causes the pinion to turn, the frame turns, thereby securing the desired direction of the vehicle.

Braking is accomplished by means of a brake drum on the ends of the front wheel axle. A foot brake operates a cable which in turn causes the action on the drums.

The entire apparatus is attached to the body of the vehicle securely by means of steel bars and produces a substantial front drive vehicle with as much power as in the modern electric truck.

This one-wheel method eliminates the necessity of a differential, universal joint, transmission gears and steering knuckles. It permits the use of standard springs and steel tires on the rear wheels, which amounts to a considerable saving.

The one-wheel arrangement can be applied to any vehicle at a low cost. It makes possible motorizing horse-drawn fleets and cheap electric trucks. It offers all the advantages of the modern motor-driven vehicle.

The traction power is as great as in the two-wheel drive with differential and the mileage greater, due to greater efficiency in transmission.

For slow speed vehicles where steel tires can be used on the rear wheels, especially in municipal service, as in street cleaning, garbage disposal, etc., the one-wheel type is very promising. Its simplicity insures reliability; and the acknowledged economy of the electric makes it much more desired and efficient than either horse-drawn or gasoline methods.

## Protecting Roads in Winter

The Department of Agriculture calls attention to the fact that water, and not cold, is the cause of injury to roads in winter, even those of the best construction. It is obvious, therefore, that it is a matter of economy, from every point of view, that roads should be as dry as possible when winter comes on. During the fall the road should be carefully gone over, and all ruts and hollows that can hold water solidly filled in to make the camber of the road surface such that it will drain quickly and thoroughly. Standing pools at the side of the road should also be drained, as they tend to soak and soften the foundations of the road, which may result in bad "heaving" when a freeze comes.

# Charging Edison Storage Batteries

*A Description of Charging Methods and the Accepted Theory of the Electro-Chemical Action*

BY E. J. ROSS, JR.

EDISON storage batteries may be properly charged by either the constant current or the tapering current method, both systems being recommended by the manufacturer with the assurance that equally good results may be obtained with either method when properly used. The constant current method of charging was adopted first and has been regularly used since 1909; the tapering current method is a relatively new development. Before proceeding with a detailed description of the charging methods, a brief description of the active materials used and the accepted theory of the electro-chemical action of the cell will undoubtedly prove of interest to those not familiar with this type of cell.

The positive plate consists of perforated sheet steel tubes, nickel-plated and filled with alternate thin layers of nickel hydrate (active material) and flakes of pure metallic nickel. The negative plate consists of thin rectangular perforated sheet steel pockets, nickel-plated and filled with iron oxide (active material). The electrolyte consists of a solution of potassium hydrate. The exact chemical changes that go on within the cell during charge and discharge are not definitely known. The following symbolic representation, however, is quite generally accepted:—

In discharge

$3\ Fe + 8\ (OH) = Fe_3O_4 + 4H_2O$ (negative)

$6\ NiO^3 + 8K + 4\ H_2O = 2\ Ni_3O_4 + 8KOH$ (positive)

In recharging

$Fe_3O_4 + 8K + 4\ H_2O = 3\ Fe + 8\ KOH$ (negative)

$2\ Ni_3O_4 + 8(OH) = 6\ NiO_2 + 4\ H_2O$ (positive)

*The Constant Current Method* of charging consists of maintaining a uniform charge rate throughout the entire charge period. This uniform charge rate should always be that rate recommended by the manufacturer as normal. Constant current rates below normal are

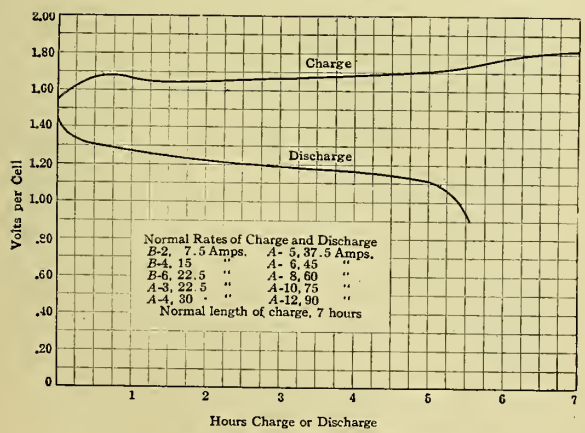



*Fig. 1—Normal Charge and Discharge Voltage Curves. Hours*

not recommended, as experience would indicate that such rates do not effect a thorough deoxidation of the negative element. Low rates of this character will in no way affect the ultimate life of a cell, but the voltage on the subsequent discharge will be somewhat below normal. Normal charge and discharge voltage characteristics of a cell when charged by constant current method are shown in Fig. 1. When direct current is available, the usual garage equipment for charging batteries by constant current methods

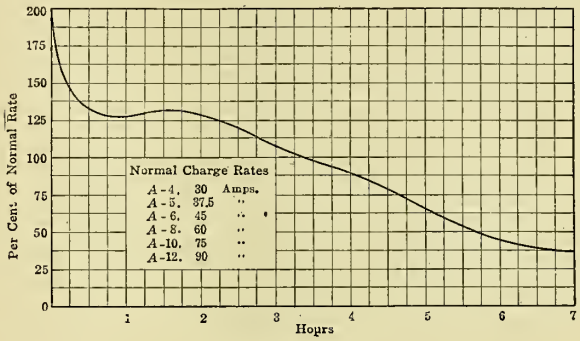



*Fig. 2—Current Curve Without Fixed Resistance. 1.7 colts per cell. Hours of Charge.*

consists essentially of suitable ampere and volt meters and adjustable rheostat. In laying out an equipment of this character it is wise to bear in mind that high boosting rates for short periods may be used. The following boosting figures may be used under normal conditions:—

5 minutes at five times normal rate
15 minutes at four times normal rate
30 minutes at three times normal rate
60 minutes at two times normal rate

The voltmeter scale should be such as will record the maximum line voltage; and the ammeter scale should be such as will record the maximum current. The ohmic resistance of the adjustable rheostat may be determined by the following formula:—

$$\text{Total resistance (ohms)} = \frac{\text{Maximum line voltage minus initial battery voltage}}{\text{Current in amperes}}$$

To determine the initial battery voltage multiply the number of cells by 1.55.

*The Tapering Current Method* of charging, now quite extensively used, is deserving of careful consideration, as numerous apparent advantages may be realized from its adoption. As might readily be supposed, there is a proper and an improper way of using this method. A proper tapering current charge is one in which the average current throughout the entire charge period is equal to the normal charge rate of the cell. An improper charge is one in which the average rate is either higher or lower than the normal cell rate. The general contour of a tapering current charging curve will vary according to whether fixed resistance is used. A normal tapering charge without any fixed resistance in the charging line is shown in Fig. 2. This result may be obtained when the voltage across the battery terminals is equal to 1.7 times the number of cells in the series. To allow for voltage loss in charging plugs, cables and lines, it is common practice to maintain an average of 1.73 volts per cell

at bus-bar of the charging line. If the voltage at the bus-bar exceeds an average of 1.73 volts per cell, a fixed resistance must be placed in the circuit. To provide for possible line voltage variations, and also for the effect of low electrolyte temperatures, it is wise to have this unit built with two or more screw taps in order that adjustments may be made should the occasion ever require. These taps should be so located that an average of 1.75 or 1.77 volts per cell might be obtained at the switchboard end of the charging line. Ohm's law is used to determine the amount of fixed resistance. Assume, for example, that it is desired to charge a 60 cell Type A-4 battery from a direct-current line, the voltage of which is 115 volts at the bus-bars. Bearing in mind that the normal charge rate for this type is 30 amperes, the proper resistance unit can be determined as follows:—

$$\frac{115 - (60 \times 1.73)}{30} = 0.373 \text{ ohms}$$

It should be borne in mind that the proper ohmic resistance of a charging unit of this character decreases as the size of the cell to be charged is increased. For example, for the above-mentioned condition, but with a Type A-6 battery, the charging rate of which is 45 amperes, the formula would be

$$\frac{115 - (60 \times 1.73)}{45} = 0.248 \text{ ohms}$$

This feature, if not provided for, is liable to prove troublesome where different size cells must be charged

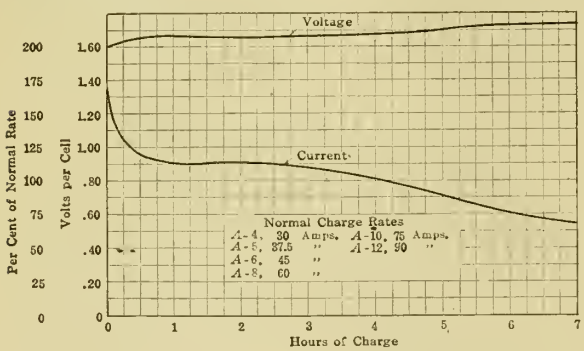



*Fig. 3—Current Characteristics of a Cell, Voltage Averaging 1.84 Volts per Cell.*

from the same line. Under these latter conditions it would be most convenient to supply a variable type rheostat, each step of which could be marked for the battery combination for which it was designed.

The current characteristics of a cell when the voltage at the bus-bar averages 1.84 volts per cell is shown in Fig. 3, the proper fixed resistance being used. As the amount of fixed resistance is increased the current curve flattens out very materially.

The advantages claimed for the tapering current method are obviously very valuable. First, hand rheostat adjustment is eliminated, thus effecting a savings in garage labor. Second, gassing and consequent evaporation of the electrolyte are materially reduced, thus prolonging the interval between flushing periods. Third, in many cases the commercial watt-hour battery efficiency is improved upon as the watts dissipated in an adjustable rheostat are utilized. Fourth, the tendency to unnecessarily overcharge is very largely eliminated, as the last part of the charge is given at a comparatively low rate, and if a battery should be left on charge too long the waste would be greatly reduced.

If an ampere-hour meter is used, regardless of the method of charging adopted, the meter should be set to operate 20 per cent slow on charge, as experience has proved that 80 per cent ampere-hour efficiency can readily be obtained in service.

One of the most recent large installations of electric delivery cars, the batteries of which are charged by the tapering current method, is that of the Ward Baking Company at East Orange, New Jersey. This fleet consists of eighty cars, all of which were built by the Ward Motor Vehicle Company, of Mount Vernon, New York. Fifty-two of these cars have a rated carrying capacity of 1,000 pounds, eighteen a carrying capacity of 2,000 pounds, and the other ten are of the "Ward Special" type, with a rating of 750 pounds. All of these batteries are equipped with 65 cell Edison batteries and Westinghouse motors and controllers. This company manufactures its own direct current and maintains approximately 115 volts at the bus-bar of the charging board. Each charging line is provided with a fixed resistance unit of 0.2 ohms and a short-circuiting switch for each resistance unit. Unfortunately, the engine capacity of this plant is not sufficient to permit of the starting of the charge with all resistance cut out, consequently it has been common practice to start the charge with the resistance units in circuit and to cut them out after the batteries have been on charge for about thirty minutes.

This method of charging has been used from the start, and has proven to be a great success. One very interesting fact observed by the garage attendants is that the condition of charge can be quite accurately determined by the ammeter reading. For example, when the current on a 65 cell Type G-4 battery falls to 10 amperes it is an indication to them that the battery has reached a state of full charge. This fleet serves seventy-two routes, the average mileage of which is twenty-nine, or a total of 2088 car-miles per day.

The average daily kw-hr. input per car is 17.3, or a total of 1,250 kwhrs. When it is considered that most of the routes covered by these cars are quite hilly, and that no particular effort has been made to economize on current consumption, it will be realized that this method of charging automatically effects power economy.

## Easier Riding Promised

One of the improvements promised for the coming year is an easier riding car—which is an acknowledgment that there was still something to be desired in this direction.

Whatever improvements are effected there seems to be no reason to expect that it will be possible to discard the shock absorber, which has heretofore been found indispensable by those who are critical about their comforts; and this raises the question whether the long, flat laminated spring is the best means for absorbing road shocks, for even with the best designs there is no question but that an additional device is required to modify the rebound, and as a matter of fact, the initial flexure is either too stiff, or else too sudden, although not as objectionable as the rebound. There appears to be an opportunity for a radical change in this feature of car building.

## Detroit Establishes Mountain Climb Record

The ancient theory still held to by some who have not kept apace with the improvements in electric car construction, received a rude jolt a few days ago when a Detroit electric automobile climbed Mount Lookout at



*Climbing Mt. Lookout, Denver.*

Denver, Colorado. The Detroit electric, it is said, is the first electric-powered motor car that has ever made this trip, which is sufficiently arduous even for big gas cars. As a direct result of this trip a score of Denver owners of Detroit electrics have planned to make the same trip and will celebrate the performance with a monster beefsteak fry on the summit of Mount Lookout.

This remarkable performance amply and successfully demonstrated that the modern electric car is a powerful automobile for any use and any occasion, in every respect of the word.

Starting from Denver, this standard model Detroit electric climbed to the summit of Mount Lookout and returned—a distance of 46 miles—in 10 minutes less than three hours.

The trip from Denver to Golden, a steady rise, was made entirely on fourth speed and it became necessary



*Arriving at the Summit.*

to employ the fifth speed only when the six-mile drag up the real mountain road began. In many places on the gradient it was possible to drop back in fourth speed. On the trip the electric passed three gas cars, which because of faulty cooling systems and boiling radiators, had been forced to lay up at the side of the road.

Probably the mechanical excellence and the increased power of the modern electric is the prime factor in the unusual rise in popularity it has undergone in the last several years. It has become well established in the minds of people all over the country that regardless of the general status of the electric car, it is a real automobile in that it possesses sufficient power and strength to negotiate rough country roads and mountain ways as well as smooth city streets. Its speed has been developed until it has all that is really needed and more than speed ordinances will permit.

Another interesting bit of evidence in regard to the Detroit capacity is furnished by the fact that a comparatively short time prior to the record established up Mount Lookout a series of interurban trips was held between Detroit and a number of outlying towns, in which a standard Detroit electric automobile, carrying a full passenger load, made trips averaging from sixty to ninety miles without a single stop on account of mechanical trouble and without recharging.

## Silent Waverley at Chicago Show

The Waverley Company of Indianapolis will exhibit a single model at the Chicago show—its 1916 Light Four, Model 110. This car is a complete departure from previous designs exhibited by the Waverley company, mechanically as well as in artistic appearance. It shows new progressive tendencies in each new feature of design, finish and furnishings.

Clear vision for the driver which was introduced in early models by the Waverley company is emphasized and amplified in this new model and is one of the most striking features of the design. The seating arrangement provides for two passengers besides the driver on the offset rear seat and the fourth on a folding chair at the front.

The exclusive four-chair seating arrangement of recent design may also be installed in this car and is exhibited at the show in the form of a three-seated divan that takes the place of the usual rear seat. This show model is upholstered in a novel piece of striped hand-painted goods of Paris design, the walls and ceiling in a rich blue, to match.

The exterior body lines are simple, dignified and well balanced. The car weighs a thousand pounds less than last year's designs, but lacks nothing in roominess and strength.

The body is mounted on a steel chassis frame with worm bevel gear using a drive of Hotchkiss type; long three-quarter elliptic rear and half elliptic front springs give remarkable riding ease. There is no spring seat, pivot bearing or torque bar requiring attention; and the self-lubricating bushings eliminate all grease cups under the car.

Forty-two cells of 11 plate lead battery are installed. The controller is of the drum type with single lever for forward or reverse. The lever steer is mounted on self-aligning ball bearings. This combination of lightness, strength, seating capacity, modern construction and practical performance makes the 1916 Waverley Light-Four a real triumph in electrical design and engineering.

---

The Chicago salon will be unlike any other show in size, character, environment and purpose. Being limited to cars of the highest grade and price, and featured by custom-designed bodies and coach work, it is planned to present the best in automobile building.

# Losses by the Flat Rate Method

*Flat Rate Service Unfair to Garageman During Winter Months When Current Demand Is High*

BY FRANCIS INGALLS*

IN December Electric Vehicles published a table showing the records of twenty typical electric cars on good roads and during the fine weather of October.

Records have been secured for most of the same cars and a few other similar cars to make up the same number during the stormy month of December, when snow and ice frequently required skid chains and more power and when the low temperature decreased battery efficiency. A comparison of these records with those published in December shows that it required 33 per cent more electricity per mile last month than it did on good streets in warmer weather.

Some of the cars were laid up part of the time in December. The mileage on the twenty, varying from 36 to 728, whereas in October it varied from 117 to 971. The kwh. of electricity used in October varied from 50 to 487 and in December from 19 to 479. An analysis of these records shows that if these cars had been kept on a flat rate of $40 per month, the garage owner would have lost from $2 to $19 for the month on each of the various cars which ran over 300 miles, according to the condition of the batteries, the mileage, and the number of deliveries and returns required. On the other hand, the owners of cars running from 167 to 219 miles, if they paid full rates, would have been overcharged from $5.35 to $8.55 each.

In December, garage men who kept electric cars at a flat rate of $40 lost money on about two-thirds of their cars, and if they succeeded in collecting full rates for the remainder, about one-third of their customers must have been much dissatisfied. Every fair minded person is willing to pay a fair price for what he gets and does not want to sponge on the garage; but no one cares to pay an excess, so that his neighbor may get something for nothing.

When gas car garages are charging from $12.50 to $15.00 per month for storage alone, and $2 to $2.50 for washing, or from $25 to $35 per month for general care of the car, plus a legitimate profit for gasoline, repairs and accessories, why do not electric garage owners try to make some profit, instead of continuing to furnish service at a loss?

The electric vehicle possesses many advantages over the gas car for some people, and the public would be willing to pay for good service, if the wild talk of irresponsible garage men and of dealers had not led car owners to think that garage men were making money, and had not given a false impression of the actual costs. For example, advertisements have stated that the electric current for a car would cost only from $5 to $7 per month, whereas the average is over $14 per month. It has been shown in recent publications that the cost of electricity for small cars is greater than that for large ones because of the resistance required to reduce the voltage in charging small batteries.

Electric garages have done the hiking, that is, delivering and fetching in cars, gratuitously, when each trip averaged an outlay in salary of twelve cents cash, plus liability insurance, and risks of accidents to property.

Every well-informed business man knows that the cost of labor must be doubled to cover overhead charges. Measured service is the only plan that is fair for all; but if any owner insists on a flat rate it should not be less than fifty dollars per month for any car.

At this rate the operation of an electric car would be much less than that of a gasoline car if the cost of gasoline, of a chauffeur and the value of time required for keeping the machine in running order are considered.

In any case good service cannot be rendered for poor compensation.

*President Elite Garage.

## Ward Establishes New Mileage Record

Official recognition has been given to a new mileage record just established by a Ward special delivery wagon, which covered 98 miles on a single charge of its battery while operating under regular service conditions through the streets of New York City, carrying its capacity load and making the average number of stops. The association's expert, John F. Delahant, was in charge of the record performance.

The route followed was from Mount Vernon, through the Bronx and Manhattan to the Battery, then north to Kingsbridge, back to Fortieth street, and back and forth between Fortieth and One Hundred and Sixtieth streets, the Hudson and East Rivers, until the battery was discharged. The distance covered was 98 miles, the total time 16 hours, 7 minutes, actual running time, 12 hours, 2½ minutes, average speed 8.1 miles per hour, number of stops 35, and the current consumed was equivalent to 164.5 ampere hours. This figures out 1.68 ampere hours per mile.

This remarkable record was not made under favorable conditions. A drizzling rain with slippery pavements prevailed throughout most of the test. No repairs nor adjustments were made. The vehicle used is the Ward special which is being marketed through a unique campaign in which all the central stations in that vicinity are co-operating.

Cups were offered to incite friendly competition among the salesmen of the various lighting companies, the first cup, which is the team prize, was won by the New York team comprised of central station salesmen of Greater New York. The New Jersey team came in second. The second cup, which is the individual prize, goes to Edward Friend, a salesman in the Harlem office of the New York Edison Company, for the greatest number of cars sold by one man. Henry S. Reilly and H. J. Garnier received honorable mention.

Arthur Williams presented the cups to the winners at a meeting of electric vehicle men in the auditorium at Fifteenth street and Irving place on December 28.

Upon signal from another driver approaching from the rear, pull over to the extreme right and allow him to pass. The law compels you, courtesy demands it.

# Operating Characteristics of Lead Batteries

*Permissible Rates of Discharge and the Behavior of Batteries Under Operating Conditions*

**To the users of lead acid storage batteries in self-propelled vehicles, the steady improvement of recent years is hardly noticeable to the eye, although there has been an increase in the watt-hour capacity of the battery per unit of space and weight, and also in the sericeable life of the battery. There has also been a marked advance in the permissible rates of charge and discharge, which has added so much to the flexibility of operation as to permit the use of much smaller batteries than would have been considered a few years ago in the same service.**

BY J. H. TRACY*

IT CAN be safely said that high rates of discharge are in no way detrimental to modern lead battery plates. Batteries of the vehicle type are in regular operation under conditions in which practically all their work is done at rates which would empty the battery in ten minutes, and the same batteries would be sold to operate at the three-minute rate if there were a commercial demand for such operation. For such high rates of discharge, extra heavy terminals are provided to carry the current, no other changes being required.

It is well known that when discharged *continuously* at a constant rate, the available ampere-hour capacity of a battery is a function of the rate of discharge, the available capacity being lower at the higher rates. This reduction in available capacity at the higher rates of discharge is due to depletion of the acid in the pores of the plates. The rate of this depletion is the difference between the rate of absorption by the plates of the acid that is in the pores of the plates, and the rate at which this acid is renewed by diffusion with the other acid in the cell. It is the limit of this available acid that limits the capacity of the battery at high rates of discharge, and not any limitation in the plates themselves. It is, therefore, impossible to damage the plates by overdischarge at high discharge rates. In fact, very low rates of discharge should receive more careful consideration than very high rates.

The variation in available capacity of a well-known battery when discharged continuously at constant rates is shown in Fig. 1; also the initial, average and final voltage per cell under the same conditions. This curve is drawn on the basis of the battery giving its rated capacity in 4.5 hours. If a battery be discharged intermittently, it is evident that during periods of rest the acid in the pores of the plates is being renewed by diffusion with the other acid in the cell. It follows that the reduction in available capacity, due to high rates, largely disappears when the high rates are intermittent. If the total elapsed time during which discharges are made be greater than 4.5 hours and if the high rate discharges are approximately evenly distributed throughout the time, so that there will be time for this diffusion to take place, approximately the full capacity of the battery will be available.

The curves in Fig. 2 are the result of tests and show the voltage and ampere-hours of discharge of a cell when discharged continuously at the nominal five-hour rate (25.8 amperes); also of the same cell when discharged in cycles of four minutes at five times this rate (129 amperes) with 17 minute rests, and also when discharged in cycles of two minutes at ten times this rate (258 amperes) with 19 minute rests. This battery was somewhat above rated capacity and gave 157 ampere hours at the nominal five-hour rate in six hours and four minutes. On the intermittent discharge at five times the five-hour rate it gave 146.2 ampere-hours in five hours and 40 minutes, and at ten times the five-hour rate it gave 137.6 ampere-hours in five hours and 17 minutes. The voltages shown throughout these discharges are amply high to meet the requirements of thoroughly good service.

Another illustration of the way advantage may be taken of the effect of acid diffusion may be shown by reference to a submarine boat. Suppose a battery is used of sufficient capacity to drive the boat submerged at full speed for one hour, and suppose this takes 3,000 amperes, after a one-hour run the battery will be practically empty at this rate, and its voltage will begin to fall rapidly if discharge at this rate is continued. If, however, the speed of the boat is now reduced so that the discharge will be reduced to say 1,350 amperes, which would drive the boat at approximately half speed, the rate of acid absorption by the plates will be reduced to less than one-half its former value, but the rate of diffusion will not be changed, more acid will become available in the pores of the plates and the discharge may be continued for some time before the available acid is again used up. Successive reductions in the rates of discharge could be made and submerged operation of the boat continued at correspondingly reduced speeds. The curves in Fig. 3 are the result of a test on a submarine type cell discharged in this manner. While the capacity of this cell was 3,000 amperes for one hour, it is shown that an additional 3,000 ampere-hours of discharge were obtained at serviceable rates and at serviceable voltages, thus doubling the radius of submerged action without overdischarging the battery or damaging it in any way.

It will be noted that the voltages shown in this test are lower than those shown at corresponding rates on the curve in Fig. 1. The use of larger plates in the submarine type of cell necessarily introduces more IR drop in the plates, which accounts for this difference. Taking advantage of these characteristics has added materially to the use that can be made of a battery where space or weight conditions are limited, or if the work to be done is fixed they permit the use of smaller and corespondingly cheaper batteries.

Equally important advances have been made in permissible charging conditions, with the result that the best rates to use in charging a battery are now generally determined by the particular local conditions under which the battery is operated rather than by limiting conditions imposed by the battery itself. In the early days of the vehicle battery, the life of the battery was considered in terms of the number of charges, and a charge once

*Assistant Chief Engineer, The Electric Storage Battery Company.

started was supposed to be completed before the battery was again used. The charge was started at a certain rate determined by the size of the battery, and continued until the cells began to gas, when the rate was reduced to about 40 per cent of this value, and continued until

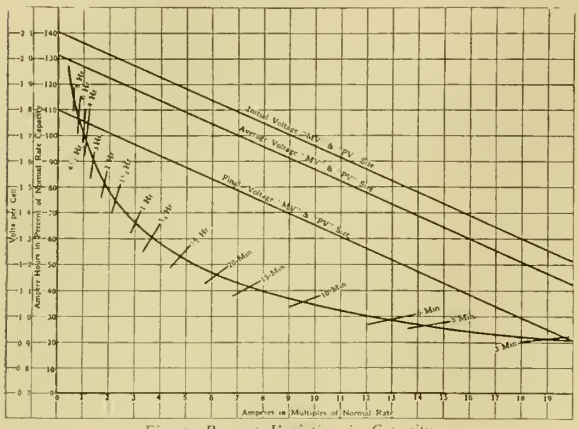



*Fig. 1—Percent Variation in Capacity With Change in Rate at High Rates of Discharge of an Ironclad Exide Battery.*

the cells again gassed freely. Later a certain amount of "boosting" was permitted, the term "boosting" being used for partial charging given in a comparatively short time and usually at rates higher than were permitted for regu-

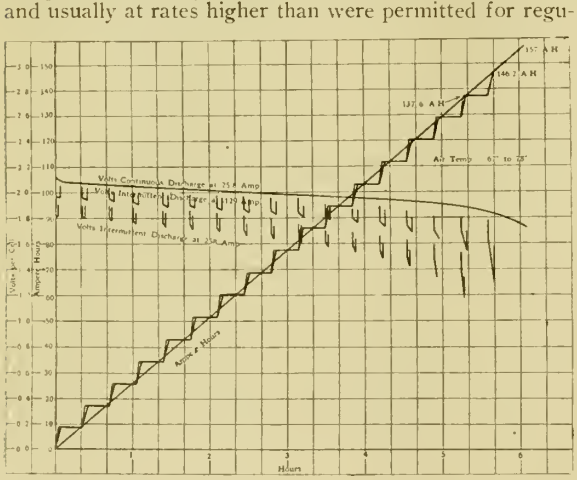



*Fig. 2—Intermittent Discharge Capacity.*

*At high rates of an MV-9 Ironclad Exide Battery Compared to Normal Discharge.*

*Discharge at 25.8 Amp.—Average Volts 1.973 Temp.—Start 94 deg.—Finish 87 deg.*

*Discharge at 129 Amp.—Average Volts 1.807 Temp.—Start 99 deg.—Finish 100 deg.*

*Discharge at 258 Amp.—Average Volts 1.633 Temp.—Start 97 deg.—Finish 109 deg.*

*Capacity when discharged continuously at five-hour rate (25.8 amp.) 157 ampere-hours.*

*Capacity when discharged in cycles of four minutes at five times five-hour rate (129 amperes) with 17 minute rests—146.2 ampere-hours.*

*Capacity when discharged in cycles of two minute at ten times five-hour rate (258 amperes) with 19 minute rests—137.6 ampere hours.*

*CONTINUOUS DISCHARGE RATED CAPACITY*

*25.8 amperes 5 hours—129 ampere-hours.*
*129 amperes 32 minutes—69 ampere-hours.*
*258 amperes 11 minutes—47 ampere-hours.*

lar charging. It is no longer necessary to differentiate between these two forms of charging.

In general, a battery may be charged at any time when a charge will be useful and at any rate which will not cause the temperature of the battery to exceed 110 degrees F. and which will not cause the cells to gas freely except at low rates of charge. If these conditions can be watched no further directions or limitations need be considered. As it is not always possible to watch these conditions, several methods of charging have been worked out which reduce the amount of attendance required while charging, and which permit the selection of the most economical way to charge the battery under any particular set of local conditions, while assuring that the above limitations will not be exceeded.

A general rule for determining the maximum permissible rate of charging a battery is:—The charging rate in amperes must never exceed the ampere-hours out of the battery. Any method of charging that keeps the charging current within this limit will not overheat the battery or cause it to gas. In applying this rule it is not necessary to reduce the charging rate below the "finishing" rate recommended by the battery manufacturers. If an ampere-hour meter is used on the vehicle, so arranged as to indicate the ampere-hours *out* of the battery, it also indicates at all times the maximum permissible charging rate. It will be noted that the maximum charging rates are no longer a function of the size of the battery or its relative state of discharge, but depend only on the actual state of discharge. The curve in Fig. 4 shows in percentage the theoretical variation in charging rate and also in state of charge if a battery

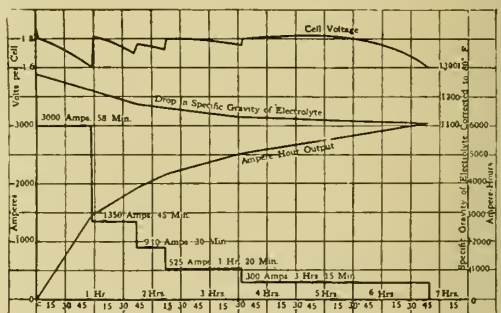



*Fig. 3—Discharge Characteristics. Of 29-U Exide cell at varying rates.*

were charged strictly in accordance with this rule, and this represents the method by which a battery may be safely charged in a minimum time in regular operation.

The curves in Fig. 5 are the result of test and show the charging rate, the state of charge, cell voltage and temperature of a battery when the current was adjusted each minute in accordance with the above rule until the recommended finishing rate is reached. It will be noted that the temperature started at 80 degrees F., rose to 100 degrees F., and then dropped off again. The voltage curves show the highest and lowest of six cells tested in series. These curves hold close together for two hours and 37 minutes, or until the cells began to gas under the maintained finishing rate, when they separated somewhat, but not seriously. The voltage curves are quite straight for the two hours and 37 minutes and between 2.38 and 2.28 volts per cell. The approximately constant voltage shown by these curves suggests that the constant voltage method of charging will approximate the characteristics given in the above rule, and that if the voltage and number of cell be chosen so that 2.3 volts be used per cell, the charging will automatically follow closely the maximum permissible rate.

The curves in Fig. 6 show the charge characteristics of a battery at constant voltage of 2.3 volts per cell when the battery is 25, 50, 75 and 100 per cent discharged at

the start of charge. This method of charging a battery is ideal, as it requires no attention after it has been connected to the charging circuit, and it puts in a large part of the charge in a short time, making the battery again ready for service with a considerable addition to the available stored energy.

Many automobile trucks are now charged in this manner whenever they are standing at their loading platforms. One-third of the ampere-hours used per day are frequently charged into the battery in this way without the loss of any time from actual service. At times of especially heavy service, as during severe snow storms, or during the holiday season, this adds materially to the usefulness of the truck. The curves already shown approximate the maximum permissible rates of charge, but these rates, especially during the early parts of the charge, are often in excess of values that are necessary or even commercially advisable, as limits below these values are frequently imposed by the amount of power available for charging and by the capacity of circuit and vehicle wiring.

The load factor of charging a single vehicle in this manner is very low, but if taken on a large system, as in a large garage or at an industrial plant using a large

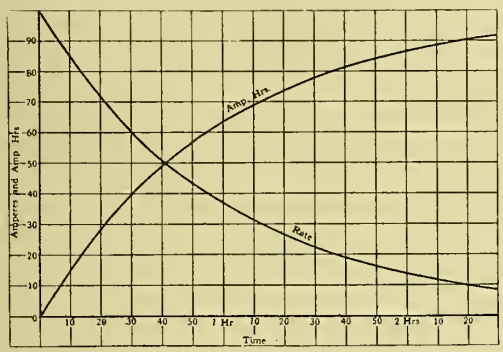



*Fig. 4—Theoretical Variation in Charging Rate. When the Charging Rate in Amperes Equals the Ampere-hours Out of the Battery. $R = Ce^{-t}$*

amount of electric power, its effect may be negligible commercially. Large garages housing electric cars only are using the constant voltage charging system, or a slight modification of it, with great satisfaction. In some cases a small resistance is used during the early part of the charge to reduce the current to an amount that can be safely carried by the wiring of the cars and the garage circuits. In other cases two bus voltages are used, each battery being charged from the low bus at about 2.2 volts per cell during the early part of its charge and from the high bus at 2.3 volts per cell during the latter part of the charge. Where there is a comparatively large number of vehicles to be charged, it is an easy matter to keep both machines loaded by transferring batteries from the low bus to the high bus and connecting additional batteries on the low bus as the current taken by the first batteries automatically falls off. An additional feature in favor of the constant voltage charging of batteries lies in the fact that no energy is lost in controlling resistances.

In case the available charging voltage is too high for the number of cells on the vehicle the excess voltage may be absorbed in counter electromotive force cells. These cells are similar to storage battery cells, except that the plates consist of lead alloy with no active material. These cells offer to the charging current an opposing voltage of 2.8 to 3 volts per cell, which is approximately constant and independent of the current flowing through them. A metallic resistance should not be used if the constant voltage charging characteristics are desired, on account of the variation of the opposing voltage with the charging current.

In cases when the low load factor caused by high

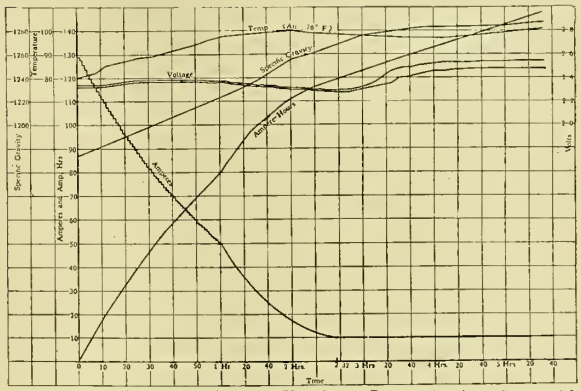



*Fig. 5—Actual Curves Obtained by Charging a Battery in Accordance with the Rule Given Under Fig. 4. The Charging Current Was Kept for One-minute Intervals Equal to the Ampere-hours Discharge. The Charge Followed a Discharge of 25.75 Amperes for Five Hours, or 129 Ampere-hours.*

rate charging is objectionable, lower rates of charging must be used and a correspondingly longer time will be required for the same input to the battery. Under many circumstances, this is in no way objectionable, as ample time is frequently available for all charging to be done at low rates. If there is sufficient time, all charging may be done at the finishing rate recommended by the manufacturers, or at any combination of rates that does not violate the general rule for permissible rates given above.

It is evident that very wide latitude for proper charging is offered from which to select the best way to charge a battery under any given local conditions. If the vehicle is equipped with an ampere-hour meter the readings of this meter may be taken as the basis for selecting a charging rate which may be used for a particular length of time, so that at the end of that time the charging rate will be at the maximum permissible rate, at which time the rate should, of course, be reduced. It follows from

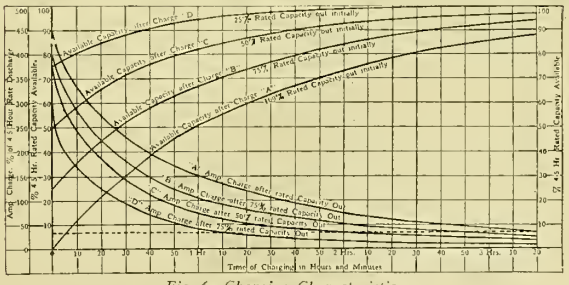



*Fig. 6—Charging Characteristics Of Ironclad Exide Battery at a Constant Potential of 2.3 Volts per Cell. Ampere-hour efficiency—95 per cent. Five-hour rate 92 per cent of 4.5 hour rate. Five-hour rated capacity=102 per cent of 4.5 hour rated capacity. Temperature of electrolyte at start 89 degrees F., at finish 96 degrees. The charge can be completed in minimum time by raising the voltage sufficiently to hold the current constant when the finishing rate is reached.*

the general rule for charging that, if $R$ = permissible charging rate, $D$ = ampere-hours out of the battery at the start of the charge (reading of the ampere-hour meter) and $T$ = time in hours until the current can be adjusted, then $R = D \div (1 + T)$ = maximum permissible charging rate for $T$ hours, and at the end of $T$ hours

the charging rate will equal the reading of the ampere-hour meter. This value can again be divided by $1 + T$ for the new charging rate, and so on until the charge can be finished at the finishing rate. If it is desired to charge the battery rapidly, the time $T$ should be taken as short as possible. For convenience Table I calculated from this formula is given. This table is of use not only in the charging room, but also for the determination of the best manner for charging vehicles under any contemplated conditions and for the selection of charging equipment to meet the requirements of these conditions.

It should be carefully noted that if an ampere-hour meter is made the basis for charging a battery, care must be taken to be sure that the meter indicates as nearly as possible the real state of charge of the battery. An accurate record of the ampere-hours discharge from a battery does not given an accurate measure of the ampere-hours

TABLE I—CHARGING RATES

| Ampere-Hours Discharged | Time Available until next Adjustment of Charging Current. | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | ¼ hour | ½ hour | ¾ hour | 1 hour | 1¼ hours | 1½ hours | 1¾ hours | 2 hours |
| | Amperes | Amperes | Amperes | Amperes | Amperes | Amperes | Amperes | Amperes |
| 10 | 8 | 6 | 5 | 5 | 4 | 4 | 3 | 3 |
| 20 | 16 | 13 | 11 | 10 | 9 | 8 | 7 | 6 |
| 30 | 24 | 20 | 17 | 15 | 13 | 12 | 11 | 10 |
| 40 | 32 | 26 | 23 | 20 | 18 | 16 | 14 | 13 |
| 50 | 40 | 33 | 28 | 25 | 22 | 20 | 18 | 16 |
| 60 | 48 | 40 | 34 | 30 | 26 | 24 | 22 | 20 |
| 70 | 56 | 46 | 40 | 35 | 31 | 28 | 25 | 23 |
| 80 | 64 | 53 | 45 | 40 | 35 | 32 | 29 | 27 |
| 90 | 72 | 60 | 51 | 45 | 40 | 36 | 33 | 30 |
| 100 | 80 | 66 | 57 | 50 | 44 | 40 | 36 | 33 |
| 110 | 88 | 73 | 63 | 55 | 49 | 44 | 40 | 37 |
| 120 | 96 | 80 | 68 | 60 | 53 | 48 | 43 | 40 |
| 130 | 104 | 87 | 74 | 65 | 58 | 52 | 47 | 43 |
| 140 | 112 | 93 | 80 | 70 | 62 | 56 | 51 | 47 |
| 150 | 120 | 100 | 86 | 75 | 67 | 60 | 54 | 50 |
| 160 | 128 | 106 | 91 | 80 | 71 | 64 | 58 | 53 |
| 170 | 136 | 113 | 97 | 85 | 75 | 68 | 62 | 57 |
| 180 | 144 | 120 | 103 | 90 | 80 | 72 | 65 | 60 |
| 190 | 152 | 127 | 108 | 95 | 84 | 76 | 69 | 63 |
| 200 | 160 | 133 | 114 | 100 | 89 | 80 | 73 | 67 |
| 210 | 168 | 140 | 120 | 105 | 93 | 84 | 76 | 70 |
| 220 | 176 | 147 | 126 | 110 | 98 | 88 | 80 | 73 |
| 230 | 184 | 153 | 131 | 115 | 102 | 92 | 84 | 77 |
| 240 | 192 | 160 | 137 | 120 | 106 | 96 | 87 | 80 |
| 250 | 200 | 167 | 143 | 125 | 111 | 100 | 91 | 83 |

*Explanation.—In the left hand column find the figure nearest to the ampere hours discharged from the battery; follow across to the column headed by the available time. The figure at this intersection is the current to be used.*

*Example.—Ampere hour meter reading, 103 ampere hours discharged; time available for boosting, one hour. Start at 100 in the left hand column; follow across to the column headed 1 hour and find 50, which is the current to be used.*

necessary to fully recharge it, for there are certain variable losses in the battery which the ampere-hour meter cannot measure. In fact, there is no accurate way to predetermine exactly how many ampere-hours charge may be necessary to fully charge a battery, nor is it necessary in ordinary service that the battery be really completely recharged daily. An ordinary clock is not an accurate instrument for measuring time, yet if it is set correctly occasionally it is sufficiently accurate for ordinary purposes. It is the same with an ampere-hour meter. It is necessary that a battery be fully charged occasionally, say once a week, if the battery is subjected to hard daily use, as on a commercial truck, and this furnishes an opportunity to set the ampere-hour meter.

A battery is fully charged only when all the sulphate has been driven out of the plates into the electrolyte, and this is most easily indicated by the specific gravity of the electrolyte. As long as sulphate is being thrown out of the plates into the electrolyte during charge, the specific gravity of the latter must continue to rise, and when the rise stops the battery is fully charged. Most battery manufacturers recommend that a battery be given such a charge (called an equalizing charge), regardless of the indication of the ampere-hour meter, once a week or once in two weeks. When it is known that the battery is full, the charge is discontinued and then the meter is set to indicate a full battery, and the meter is then a sufficiently accurate indicator of the state of battery charge to be used for a week or two weeks until another equalizing charge is given the battery, when the meter should again be set.

Ampere-hour meters require cleaning and regulation at intervals as does a clock, and if they are treated in this manner they are of great assistance in the proper handling of a battery. These meters are frequently furnished with a contact making device so arranged as to interrupt the charging circuit when the meter indicates that the battery is fully charged, and this is a valuable protection against unnecessary charging and gassing of the battery during ordinary operation. This tripping device should, of course, be disconnected during the equalizing charge.

## Synthetic Rubber

In 1905 Harries determined the chemical formula of natural rubber. In 1909 Hofmann and Coutelle made rubber from isoprene by heating in a closed tube. A year later Harries reported a similar success, heating, however, in the presence of glacial acetic acid. The work was taken up by others and rubber produced from other hydrocarbons similar to isoprene. By heating with different substances it has been found that a series of rubbers is obtainable which differ largely in properties.

Synthetic rubber has been produced from butanes, constituting a certain group of hydrocarbons, from isoprene and from dimethylbutanes. The process of changing over, called polymerization, can be performed in the presence of metallic sodium, or in an atmosphere of carbonic acid with metallic sodium, or with the use of ozonizers on peroxides as catalizers. The resulting rubbers will vary widely as to their solubility, elasticity, susceptibility to vulcanization and inflatibility. Thus rubber produced from a butane by the sodium process is easily soluble, elastic and capable of being vulcanized, while one made from dimethylbutane by the ozonide process is inflatable, soluble only after calendering, non-elastic and can be vulcanized only as hard rubber.

The variations in qualities of different synthetic rubbers gave rise to the hope that by slight changes in treatment, rubber with any desired combination of properties could be easily produced. The commercial importance of rubber synthesis is a different matter; to rival natural rubber, synthetic rubber must equal it in both price and quality. The price will in turn depend chiefly on the cost of the hydrocarbon of which it is made and this cost would naturally rise as the demand for the commodity increased. Starch, amyl alcohol, turpentine, acetylene, are other raw materials available. But the present rubber production of the world, about 100,000 tons a year, would require for its synthetic duplication the planting of an area of corn or potatoes many times the area now in rubber trees. The disposal or utilization of the resulting byproducts would be a serious problem. At present there is no possibility of serious competition with natural rubber in price. Until manufacturing processes are able to turn out a uniform compound, the synthetic rubbers will remain inferior.

# Garaging and Its Evils

*Address Before the Garage Owners' Association of Michigan*

BY ROBERT BLAND

"THE evil that men do lives after them," wrote Shakespeare; he might have added: "And one day will appear to afflict the garage owner and dealer."

It is a consolation to know that we, the garage owners and dealers, have organized to uncover the "good that oft was interred with their bones."

Garage evils! What are they? How do they affect and afflict us? How are we to get rid of them? Those questions are best answered by the fact that we have at our command an instrument—our associations—that will eliminate the most of the evils to which the business has fallen heir. The instrument is fully potent—if we use it, but in that event only. We must also see to it that we do not violate all Scripture ethics for the government of business transactions, otherwise we degrade the business and make it a stench in the nostrils of the public.

In an age when human life is cheap in half the world and when it seems to be the rule for business men and tradesmen, small and large, to prey upon one another and upon the public, it may seem strange to urge that Christian principles should govern men in trade; but it is absolutely certain that the best success in business depends upon the strict observance of the moral laws of God and that every man that violates those laws will surely be punished; will sooner or later lose out in business as well as in character, peace of mind and happiness.

The all-comprehensive rule for human conduct is the Golden Rule: "All things whatsoever ye would that men should do to you, do ye even so to them; for this is the law and the prophets," MATT. vii, 12; and "Thou shalt love thy neighbor as thyself," MATT. xxii, 39, and LEVITICUS, xix, 19.

The common version of the Golden Rule as applied in business is: Do others first, or they will do you, and love your neighbor as long as you can fleece him.

Christ's measure of love to neighbors, "as thyself," and "as ye would," is his doctrine of the fair deal. Not that you should love your neighbor more than you should love yourself, or do for him in trade more than you would have him do for you, but *as much*. Consider his interest as well as your own. Take not all the trade will bear, or all you can inveigle or cheat him into giving you, but only what is fair between man and man. As much as possible standardize your business, all give one price and a fair price to all. That will protect the honest business man from price hagglers who never consider his interests,—his right to sufficient profit to cover his legitimate overhead and something to lay by for a rainy day.

We are a motley bunch, we garage men and dealers. We include every type of man to be found in the gallery of civilization. In our ranks you will find the modern business man who has made a big investment in building, equipment and merchandise. His enterprise is backed by adequate capital, by knowledge of how to conduct a business, but notwithstanding these safeguards, you will find his business is affected by the same demoralizing factors that influence your business and my business.

In our ranks you will find the mechanic, who, whatever his knowledge of a motor car or electric, knows nothing about business, and consequently does not know how to make prices, but succeeds in making your prices and mine. Absurd, isn't it?—but true just the same.

Take the man with the investment and the knowledge and you could not induce him to subscribe to an unbusinesslike theory such, for example, as selling service and merchandise for less than it cost to deliver, but in practice he does exactly as the remainder of us do for the good and sufficient reason that he is powerless to do otherwise.

In the great struggle of humanity—in war, industry or in social life—the individual does not count. But the fabric of civilization takes its color, derives its strength and secures its value from the threads that are woven into it, and these threads are our lives. Consequently I wish to say again that the day of individualism has passed but never before was the individual of such importance.

Recently I read a story based on the war in Europe in which the leading man explained his refusal to join the army on the ground that civilization, not he personally, was responsible for the war. The girl in this case replied that as all were responsible for the conditions producing the struggles, all should take an equal share of the responsibility and shoulder a fair share of the load.

That is the situation in the garage field. We all are in a measure responsible and all should share a part of the burden. If we eliminate the conditions which now surround us, we, you and I and the other fellow, will each do our part in tearing out the false and building in the true.

That may sound like a platitude. It isn't. It is the concrete essence of all we are trying to do.

To me the item of first importance among the evils afflicting the garage man and dealer is *ignorance*. There are many things about this business of ours that we do not know. There are more things about business principles of which we are ignorant. And to this ignorance on our part is added the profound ignorance on the part of the public of what the garage man and dealer is and what he should do and does.

There is no excuse for ignorance in this country. Ignorance on the part of a man engaged in business is a sure indication that that man is lazy or feeble minded. There are far too many means of acquiring knowledge to justify any man in remaining ignorant and at the same time remaining in business.

Ignorance of any phase or detail of our own business is a crime. It carries with it a penalty that is automatically inflicted. That penalty is *failure*, absolute commercial ruin, or that small measure of success that makes work a burden and business a bore.

Our real purpose in life is to do our work, to be happy, to prosper and to help the less fortunate up to the level we occupy, just as those above us should reach down to help us up to their level. We cannot accomplish this purpose if we remain ignorant.

We are so accustomed to the manifold benefits of this great free country of ours that we are inclined to hold them in light esteem. We inherited this country and

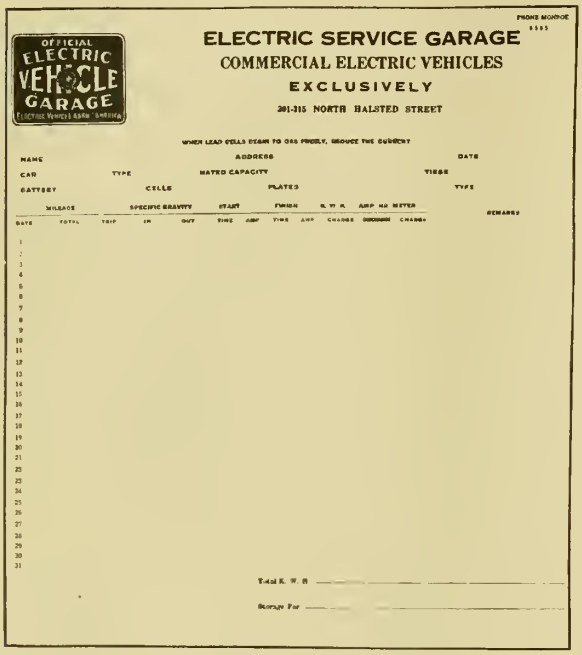
*President Associated Garages of America.

we prove ourselves worthy of the heritage only as we improve the property left to us.

Please follow me in that statement: This country, our state, our particular locality, our business does not owe us anything. We owe every one of them a great deal and the big question is: "How are we going to pay unless we make a profit, a financial and successful profit, with which to pay?

You are all familiar with the type of garage owner who is on duty long enough each day to pocket the proceeds of the business and who requires the remainder of the twenty-four hours to put the money back into circulation. He is one of the evils with which we are forced to contend.

He is entirely capable of eliminating himself from the business and will do the job quickly and efficiently. While he is with us and of us we suffer for what he


PHONE MONROE ****

OFFICIAL ELECTRIC VEHICLE GARAGE

ELECTRIC SERVICE GARAGE

COMMERCIAL ELECTRIC VEHICLES

EXCLUSIVELY

201-215 NORTH HALSTED STREET

WHEN LEAD CELLS STEAM TO GAS FREELY, REDUCE THE CURRENT

NAME ADDRESS DATE

CAR TYPE RATED CAPACITY TIRES

BATTERY CELLS PLATES TYPE

MILEAGE SPECIFIC GRAVITY START FINISH K. W. H. AMP. HR. METER REMARKS

DATE TOTAL TRIP IN OUT TIME AMP. TIME AMP. CHARGE DISCOUNT CHARGE

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31

Total K. W. H. ——————

Battery For ——————

*Monthly Garage Bill Showing Complete Daily Operation.*

does and particularly for the things he does not do. He casts discredit on us. It is time for him to get into the business game and to cut out his joy-riding.

The longer I live the more I am convinced that most of our troubles originate within our own ranks. People don't make trouble for us. We make it ourselves and then try to give others credit.

We are suffering all the penalties the crime of being young imposes. Youth and irresponsibility are closely associated in the public mind. Garages and irresponsibility—or worse things—have been identified.

Year by year we are emancipating ourselves from the handicap of youth, but is age giving us the degree of workable wisdom it should give? Some of us are still frisky, some of us want to continue to play at being business men.

Why should not we garage men get into the game of business and play it according to the rules laid down by business men? That is our right. If we do not exercise that right we should not bewail the fact that business men do not care to play with us or to overlook our disregard for the rules. You may answer that if we do not get a square deal. That is absolutely true, but we are responsible.

If we, as business men, are ignorant of the rules of the game, or if we ignore them, what right of protest have we when others ignore them in their dealings with us?

Let's get this beam out of our own eye before talking about the mote in the eye of the other fellow. When we are given short discounts—when the manufacturer or the jobber ignores us and sells direct to the consumer, when we suffer loss of patronage because the manufacturer says, "Get your car out of that garage or forfeit your guarantee," when the public is advised not to place any trust in garages or garage men, the daily press storms and raves and ridicules us, when these and other things too numerous happen, we do not feel like trying to establish friendly relations with those with whom we deal.

Now the fact that the men who make some of the cars and the supplies and accessories we handle are small and mean, does not compel us to get down to their level. True, they should endeavor to help us, not try to pull us down, but their failure does not excuse us.

They are men like ourselves. Some of them are broadgauged, some of them have a yellow streak. Possibly some garage men have a yellow streak and we know lots of them are big fellows, so that we humans average up pretty well.

You can take the good points or the bad ones of any lot of men and find justification for any course you may elect to adopt toward that group. The way to real betterment, the road to reciprocity that means something and will get us somewhere, lies along the course I have endeavored to chart. We must pay for what we get. The lowest price and the best terms are made to those who come forward and pay willingly and as a matter of course. If we hang back, or neglect to pay, the price is taken out of our hide in some way just the same.

We garage men should pay our way and pay willingly. We should pay with money, time and thought. We must cancel our obligation in this way if we derive a profit from the investment, and pay we must for all we get, whatever we get out of our lives and our business.

This time I have not elected to talk about the physical things of the garage business. We all realize the need of an adequate accounting system, we know we are paying higher insurance rates than we should pay, we know the tires, battery, accessory and supply men are selling direct to consumers, we know there is evil upon evil in the business and we know also they stay there unless we work to rid ourselves of them; but the most serious evil is the evil of ignorance. A close second is the evil of self-satisfaction, the evil of trying to hog the business and losing money by trying to keep the other fellow from making money.

Our first and greatest work, therefore, is to put ourselves in the proper attitude and our business in order. If we stand ready to do the square thing and to see that all with whom we do business reciprocates by doing what is right, we will have accomplished the first and begun to put to use the "good that was interred" with the bones of our predecessors.

---

When unable to see what is ahead at any time, slow down.

# Methods of Design and Operation

*The Character of the Supervision Which Makes for the Efficiency of the Electric Vehicle*

BY S. C. HARRIS*

TO ACCOMPLISH the best results in any field of endeavor, a method must be followed so that work to be done may receive attention of the proper kind and at the proper time and place. Attention of this kind can be given only by intelligent supervision. This may seem trite as a general remark, yet when applied to electric vehicle operation, it has a special significance. The electric vehicle industry is comparatively new and has not yet reached the state where the best methods, generally, are being employed in construction and operation. Although the electric vehicle is not yet up to the standard of perfection to which it can attain, yet from present equipments splendid service is being obtained where adequate attention is being given.

The character of supervision given to operation is probably the most important feature in an organization where success is being obtained. Many of the oldest types of machines have been successful because competent men have been in charge, while cases are known where well designed, up-to-date vehicles have not been satisfactory to the owner because the one directly responsible had not sufficient knowledge nor the desire to obtain that knowledge which is requisite to properly superintend the operation of the vehicle.

The battery, motor and controller are the parts of the vehicle which are least understood by the average man employed in a garage. He may know the construction of each of these parts well enough, but he is usually unable to comprehend the interdependence of one or the other. For example, if the vehicle is running at a lower speed than usual, the brakes are examined and if not found to be binding, then it is decided immediately that the battery is not in shape; the battery is taken out, tested and found to have full capacity. Further search is made for the trouble and it is found that a controller finger is not making contact. Even with this information, many times the repair man has only a hazy conception as to the reason why a loose controller finger should cause the lower speed. The man in charge of the garage should be sufficiently conversant with the construction and operation of all parts of the vehicle to be able to prevent such mistakes from occurring and lowering the efficiency of his fleet. The superintendent usually depends too much upon his subordinates to do what is distinctly his own duty, that is to keep in touch with operation and repair work in sufficient detail to assure himself that all departments are working harmoniously with each other, and that nothing is done out of time or indifferently due to the personal equation of the foreman. In some cases the man in charge of a garage is not familiar with any part of a vehicle and, of course, depends entirely upon the men under him who are generally without theoretical knowledge of the component parts of a vehicle and often unable to correctly diagnose troubles which occur, causing delay and waste of effort. These foremen are usually men who have grown up with the business and feel that their superior knowledge should not be questioned with the result in some instances that rules are formulated and methods for doing work are followed which are not best and often at variance with those advised by the manufacturers.

Add to this the confusion caused by the various forms of construction of vehicles being manufactured and some conception can be obtained of the chaotic conditions existing in garages where all makes of cars are cared for. This condition naturally suggests that wherever possible parts that can be made standard for all vehicles should be made so. The gain in efficiency of operation and cost of construction due to any one design is insignificant when compared to the convenience in operation and the reduction in the cost of parts which would follow the adoption of standards where possible by all vehicle manufacturers. This might be done to a limited extent, but by far the better course to pursue would be the combination into one large corporation of all the electric vehicle companies and the designing of a vehicle which would be composed of the good features of the various designs.

From figures given out, it is obvious that many in the industry are convinced that the electric is a more efficient machine within its field than any other form of commercial vehicle and that the handling of merchandise, in large cities especially, is to be done almost exclusively by this type of truck. With this immense field for activity, it is evident that a great effort must be made if this valuable prize is to be won. With the present method of doing business, in other industries where wonderful strides have been made, you know that combinations have been necessary in order to produce commodities in the most efficient way. Large establishments are becoming the rule, not the exception, as with the electric vehicle industry. Why not realize this fact and make a serious effort to convince the various manufacturers to take a broad view of the situation and combine the capital of all into one corporation, utilizing the factories in different localities for assembling and caring for the business generally in their several territories, the standard parts being made on a large scale and shipped to the various points for assembly? The man big enough to do this can be found when those now interested and convinced of a great future for the electric vehicle make a concerted effort with all of the enthusiasm born of conviction that we have the best article of its kind to offer the public. A parallel may be drawn between this industry and the storage battery industry about 20 years ago. At that time, there were several companies, each with a battery that had supposedly superior qualities to those of the others and making strenuous efforts to accomplish results before the financial backers tired of advancing capital. W. W. Gibbs of Philadelphia, a promoter, recognizing the precarious condition of the business and also the possibilitics of the storage battery, formed a stock company and acquired all the patent rights that were valuable. From this impetus the battery business developed rapidly and has for a number of years been classed among the big business enterprises.

Probably the activities of this association, if devoted more to the subjects just presented, might

* A paper presented before the Electric Vehicle Association.

produce far-reaching results. Since the formation of the association, too little has been done in this direction, and for that reason the following subjects are presented as part of the work that might properly be done: A study of (1) the methods of construction of the various makes of vehicles with a view to standardization; (2) the methods of operation in the various garages in order to produce a standard which will be most efficient; (3) the battery rental system; (4) a study of the methods of construction with a view to standardization.

The experience of a large private garage where many makes of vehicles are operated will show concretely the desirability for standard methods of construction.

In this garage, there are 130 vehicles ranging in size from a two-passenger runabout to a five-ton truck. The building up of this fleet has extended over a period of about 12 years and almost every make of vehicle is included in it. The delivery service in this particular business required that extra batteries be kept constantly in reserve so that in emergency work no time may be lost in charging batteries, as in many cases one vehicle is required to do an amount of work in one day equal to the capacity of two batteries. By the use of reserve batteries, the time the vehicle is out of service is the time consumed in changing batteries, which is about ten minutes. The number of different designs of vehicles in the fleet is eight. The number of cells per battery varied from 40 to 48. In no two vehicles of the same capacity, but of different designs, would the same battery fit when received from the manufacturers. Because of this variation in the dimensions of battery compartments, 155 batteries were necessary to operate 120 cars. When the number of spare batteries reached this point, the superintendent decided to try to standardize the battery compartments where it was possible to do so without too much alteration in the construction of the vehicles. As each machine was taken out of service for a general overhauling, the battery compartment was made to agree in shape and size with a standard arranged for the particular group into which it could be made to fit. Since this work was started the battery compartments have been rearranged in 65 trucks. Before overhauling, the number of extra batteries needed for the 65 trucks was 24. By the rearrangement, this number has been reduced to exactly 11. The voltage of the charging bus has been lowered 14 volts due to reducing the 48-cell batteries to 44 cells. The amount of space required for reserve batteries is much less, and the mind of the battery man is more tranquil because he now has less bookkeeping to do. The reduction in the investment for spare batteries, so far, has been $5,000.

METHODS OF OPERATION IN VARIOUS GARAGES.

The committees of the section of the association have not devoted much effort towards securing information on the details of garage operation and the results obtained by different practices. To be of material value to the men whose duty it is to help sell vehicles, not as salesmen, but as men who help to keep them sold, and by their different methods made a good showing to the prospective purchaser, this association should make greater efforts to increase this class of membership and make a fair share of the meetings consider subjects in which they are interested. This kind of meeting cannot be made entertaining enough to hold the attention of garage men unless their work is studied in all its details by the committees and attractive programs made for the meetings. If these men can be induced to attend meetings where they will get information that will compensate them for attending, regardless of whether they are members of the association or not, the work of the association will then be of much greater value and its standing will be higher in the estimation of the men who are really the mainstay of the industry. The membership committee's duties should not end when they have secured a new member, especially a garage man, but each member of the committee should feel it incumbent upon himself to bring one or more of these men to meetings that are especially arranged for them.

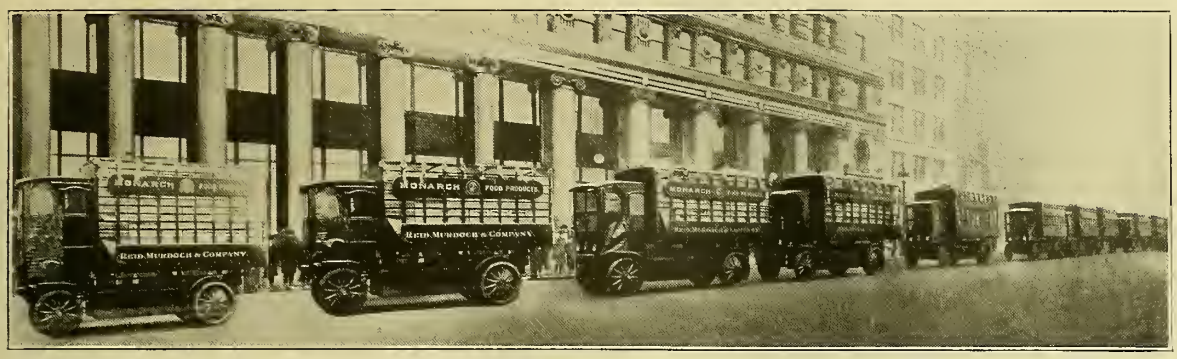
Such subjects as the handling of batteries, the means employed to preserve the trays and rubber jars, the manner of charging which is most efficient and requires least attention, the construction of charging panels, receptacles and plugs, the proper training of drivers to get the best results in the life of the various parts of his machine, the records which should be kept to show what the results are being obtained in the life of the wearing parts so that bad practices may be detected and remedied, can be investigated with the assurance that improvements will result.

The electric vehicle has been in use extensively in New York City for the past five years, yet in the recent snowstorm a number of cars could not get a boost because the charging plugs would not fit the receptacles on the cars. One driver was unable to get a boost because of an open circuit. The station attendant proved his circuit was continuous up to the charging receptacle on the car. The driver was about to leave without a boost when the station attendant noticed a small box and asked the driver what it was. "Oh! yes," said the driver, "that is a breaker," and it was found that it was an open circuit breaker. This was after about three-fourths of an hour search of the battery and car. Another driver who asked for a 40-ampere boost was requested by the station attendant to take a higher boost, as another car was waiting to go on the plug. A 100-ampere boost could have been given without damage to the battery. The reply was that if the battery were boosted at a higher rate than 40 amperes it would blow up.

All such small defects in the equipment and handling of vehicles as well as the inefficient practices in the garage can be remedied by the work of the committees in conjunction with the association. The distribution of books and pamphlets containing information on the best practices does not accomplish the results expected, as only the studious, conscientious man profits by this method of instruction. Most of the garage men from the top to the bottom must be interviewed and in some way checked in their activities in order to get the most efficient operation generally. There are, no doubt, many members of the association taking an active part in the promotion of the electric vehicle and much interested in the garage who have no definite idea of which practice should be made standard. If this assertion is correct, then it is high time that a concentrated effort be made to formulate a method or methods which will produce results strived for and endeavor to convince the garage owners that the conclusions we have reached are of value to them.

---

Exhibitors at the New York automobile show state that the public showed greater interest in the electric this year. The exhibits of electric cars were crowded.




*Walker Vehicles in Reid, Murdoch & Company's Parade.*

## Chicago Grocer Buys Eleven Electric Trucks

After a careful study of transportation methods, covering a period of two years, Reid, Murdoch & Company, wholesale grocers, Chicago, decided upon the electric vehicle as best suited to its needs and consequently purchased a fleet of 11 Walker trucks of three and five tons' capacity. Coincident with its decision to use the electric, the company, which operates a large electrically driven coffee-roasting plant, conceived the idea of capitalizing on the advertising value of an electric delivery system by inaugurating a coffee-selling campaign based on its modern equipment for producing a meritorious article and on its improved delivery system.

Numerous circulars embodying these thoughts were distributed, and although the present time is said to be the dull period in the coffee business, over 600,000 pounds were sold during the campaign, which lasted less than 30 days. Officials of Reid, Murdoch & Company state that at no other time in the history of the company has such a volume of business been done with so small an advertising expenditure.

The culminating feature of the campaign was a parade of the company's new electric vehicles loaded with coffee, bought during the campaign, which was held in the business district of Chicago, December 23. It was originally thought that the company's fleet of 11 vehicles could handle the sales, but this was soon seen to be impossible. The Commonwealth Edison Company therefore was called upon for help, and loaned 60 of its electric trucks for the parade. Fourteen additional electrics were secured through the Walker Vehicle Company, making the total number in line 85, each loaded with about two tons of coffee.

The parade, led by a police squad and band, attracted considerable attention, and undoubtedly will result in stimulating interest in electric delivery. One of the features of the parade which had an influence of the enormous sales made was the offer of the company to send photographs of the event to every purchaser with his name prominently displayed as contributing to its success.

## Radiator for Electric Passenger Cars

Practically the last objection to the electric vehicle as an all-year car has been overcome in the product developed by the Lee Electric Radiator Company of Chicago.

This company has succeeded in adapting an electric radiator to operate successfully upon a 40 or 80 volt battery on a minimum consumption of energy. The comfort and convenience in both damp and chilly weather is made possible by the installation of one of these radiators, which is of the cast iron type and is attached to the floor of the car in any location desired.

The principle involved is that of an open resistance coil submerged in an insulating fluid with which the radiator is filled. The life of the unit is practically indeterminate, the element being almost indestructible and the dangers and hazards accompanying other heating systems being entirely eliminated.

The accompanying illustration shows an actual installation, which you will note is conveniently placed in a position so as to give sufficient heat, at the same time being out of the way.

After the successful performance of a great number of these radiators in actual use, they are now placed on the market for sale to the electric users and can be obtained from all electrical dealers as well as from some of the garages.

Prompt delivery can be made by the manufacturers, whose general offices are at 629 Peoples Gas Building, Chicago.

## New York Vehicle Meeting

E. W. Curtis, Jr., of the General Vehicle Company, gave a very interesting talk on "Electric Vehicle Conditions in Europe," at the meeting of the New York section of the Electric Vehicle Association of America, held on December 28.

At the same meeting S. C. Harris, storage-battery expert of the New York Edison Company, read a paper on "Methods of Design and Operation Which Assure Efficiency of the Electric Vehicle," advancing many new and novel ideas based on practical experience and thorough study of the electric-vehicle problem. This paper brought considerable discussion from many prominent engineers and proprietors of electric vehicles, and appears in full elsewhere in this number.

A special feature connected with the meeting of the section was the exhibition of one of the electric taxicabs of the Detroit Taxicab Company. It was stated that 25 of the cabs have been in operation in Detroit for over a year with great satisfaction to the taxicab company, formerly large operators of the gasoline type, and that the Detroit public was keenly interested in the new development. Several engineers present, in close touch with the taxicab situation, predicted their general introduction in the larger cities of the country because these cars overcome the disadvantages of other types of taxicabs.

# Electric Vehicle Association Developments

*Sectional Development Work, Reports of Committees and New Announcements*

**This department will hereafter contain all activities of the Electric Vehicle Association of America, in all of its sections, as reported by A. Jackson Marshall, national secretary.**

**Realizing the valuable co-operative development work which the association is doing, the publishers of ELECTRIC VEHICLES offer this exclusive section to association members and all electric vehicle interests in order that they may keep closely in touch with association matters.**

BY A. JACKSON MARSHALL*

THERE was a meeting of the Chicago Section on November 9, Chairman George B. Foster presiding.

The secretary, representing the Commonwealth Edison Company, told of a new regulation by this company whereby the owners of commercial electric vehicles can obtain a maximum rate of 4 cents per kilowatt hour, the same as has been in force heretofore in public garages.

After a few preliminary remarks by the chairman of the section on Standardization Committee work, W. F. Bauer, chairman of the local Standardization Committee, gave a resume of his committee's activities. He cited that their endeavors were practically a parallel case for the great improvements in railway lighting which had come about after a great deal of effort on the part of a few interested parties. He told quite in detail of the committee's findings up to the present time as regards economical numbers of cells per battery, sizes of jars, and arrangement of trays. He said that their activities at the present time were upon the subject of battery maintenance of rental service, and also said he would welcome any suggestions as for the most urgent work to be taken up after January. 1.

At the November 16 meeting W. F. Bauer, the vice-chairman, presided.

In lieu of the regular program, which it was found was impossible to follow, Mr. Bauer read "The Electric Taxicab," by I. S. Scrimger, as presented before the recent Cleveland convention. The paper was read in its entirety, after which a discussion took place in which all present participated.

On November 23 the section held a meeting, at which time George B. Foster, chairman, presided.

Harry Newman Tolles, vice-president of the Sheldon School, was introduced and consumed the time of the meeting by a very interesting and helpful talk on the subject: "Fundaments of Business Building."

The Chicago section has inaugurated a scheme of considerable merit and one which our other sections might, with profit, follow. This consists of a series of weekly bulletins to be mailed to each member with a notice of each weekly meeting. It is its aim to have these bulletins carry some suggestions or some interesting information to the members each week. It has a very aggressive chairman in charge of the work and already has about 20 subjects written up ready to be put out, which ought to make a very interesting series.

At the November 30 meeting George B. Foster, the chairman, presided, and called upon Gail Reed to tell the status of the electric parking service. He said that arrangements had been made for a second station, which while it was only a few doors south of the present station at C. Jevne & Co., 40 North Michigan avenue, yet it would enable them to take in two garages of the Fashion Auto Station and would enable them to have greater facilities to take care of the natural rush of business during the holiday season. Mr. Reed said that the Garage Committee, of which he is chairman, was co-operating with the Membership Committee in an endeavor to get in the remaining manufacturers and garages who ought to be, but who are not now, in this service.

A. J. Brechtel, a Chicago salesman for the General Vehicle Company, the speaker of the day, was then announced, and talked on what the E. V. A. A. is not accomplishing, his remarks being, of course, in every particular from the viewpoint of a commercial electric truck salesman. He said that the association should not only look for numbers in the membership, but should look well to the timber. Garages could noise about that there were such things as electric trucks. The truck manufacturers would be perfectly willing to co-operate in all particulars, giving the necessary information. Garages could care for electric trucks, and if it is found impracticable for them to associate with passenger cars, a space could be arranged and fenced off. At any rate, an electric truck added to the man's place of business ought to have considerable credit on the right side of the ledger at the end of each month.

At present, the battery companies are going their several ways. That is, one company is paying too much attention to the commercial business only. Another company is catering too much to one vehicle company alone. Another company will be catering to other vehicle companies or class of business, etc., etc. Mr. Brechtel thought that although the majority of the business came from certain fairly well-defined lines, they should pay consistent and energetic attention to all branches of the service.

Chairman Foster then made some remarks on co-operation; he thought that it was the keynote of the whole situation. He said it did little good for anyone to join any kind of a club if they did not attend it and get into the spirit of the proposition. He also made a few remarks on the electric parking service, and said while it may not have resulted in the sale of a single additional car, yet it has made many more satisfied customers, or else had enabled car salesmen as well as garages to make the customer feel the good of the proposition, and therefore keep their electric cars instead of trading them for the gasoline type.

W. J. McDowell of the General Motors Truck

*Secretary Electric Vehicle Association of America.

Company made a few remarks on how he thought we could help the electric truck business. The first suggestion was to the effect that more publicity of all kinds is needed. This could take the shape of newspaper or billboard advertising. The second idea was that more missionaries could be put into the field so that more people will be talking the merits of the electric truck. He said that at the present time, there were few electric truck salesmen on the job in Chicago, as compared to the number of those representing or selling the gasoline vehicle.

Gail Reed suggested that a great deal along the line of publicity could be done without much expense. His plan was to send in data to the office of the secretary of the Chicago section. This could be written up and distributed to the various members. Mr. Reed ended by moving that each member write down just what his idea of co-operation is and send it to the office of the secretary just as soon as possible, which motion was seconded and carried.

Mr. Brechtel then asked if he might ask some of the garage men present to tell what they might do towards dispensing information to the prospective users of trucks. This was answered by Harry Salvat of the Fashion Auto Station, who said he believed that they had a great chance to do many things along that line, and that why so many of them were apparently indifferent to their possibilities or to the electric vehicle industry, was because at present, many of them were very much dissatisfied with their own business. In most cases, this has been due to a lack of profitable business arrangements with many of them. To show what the garage could do in the way of co-operation in joining the electric vehicle proposition, he went on to relate the history of how his garage established the Electric Parking Service about one year ago. Mr. Salvat thought that the manufacturers' tactics ought to be better, and that if this were done that a great deal more co-operation could be expected from the garage men. Mr. McDowell then made the statement that as a starter, his company would give 10 per cent to garages on all electric trucks which they were instrumental in selling.

LOS ANGELES SECTION.

At the last regular meeting of the Los Angeles section, the following officers were elected for the ensuing year: Chairman, Harry W. Harrison of the General Vehicle Company; vice-chairman, R. R. Thomas of the Electric Equipment Company; secretary-treasurer, J. O. Case of the General Electric Company.

NEW YORK SECTION.

A meeting of the Executive Committee of the New York section was held December 28, and the regular monthly meeting of the New York section was held in the auditorium of the Consolidated Gas Company, the same evening at 8:15 p. m., at which time S. C. Harris presented a very interesting paper, entitled "Methods of Design and Operation Which Assure the Efficiency of the Electric Vehicle." This paper is herewith produced verbatim.

## Rental Battery System Proves Successful

In the city of Chicago, the Walker Vehicle Company is the first to offer the purchasers of electric cars the opportunity of adopting the rental battery service, by selling to those who desire this system, all 1916 models at a reduction of $270 from the new list price. By this policy the purchaser of an electric car can rent complete battery service at a minimum charge per month and need not stand the investment that is necessary when purchasing a battery with the car. Furthermore, the new rental service which is now being offered in Chicago by the K. W. Battery Company, 1532 Michigan avenue, covers the entire maintenance and repair expense incident to the hardest use that batteries can be given.

In other words, the owners of the electric car pay so much per month for the use of the battery regardless of upkeep or maintenance expense and regardless of whether the car is driven fifty or one thousand miles a month. When the mileage of the battery through wear fails to cover requirements, the old battery is replaced by a new one, thus keeping a constantly fresh battery in prime condition for the use of the car at all times.

The Walker Vehicle Company has been giving this K. W. battery service a thorough try-out and so far has been very well pleased with the results obtained.

It is believed that this new system will prove one of the greatest economy factors introduced for the use of electric cars, particularly to those desiring longest mileage, and it is hoped that in the near future this system will be possible in all points of the country to users of electric cars.

## S. A. E. Discusses Glaring Headlights

That glaring automobile headlights are as needless a menace to traffic safety as they are common, is the growing belief among those who have devoted careful study to the subject. Electrical experts and others, after careful consideration have become convinced that the principal source of glare in the case of the ordinary automobile headlight is waste light that is projected into the air instead of being concentrated on the road, where it is needed. By eliminating this waste it is thought that more efficient road lighting can be developed, while the glare nuisance can be reduced to a minimum of absolute safety.

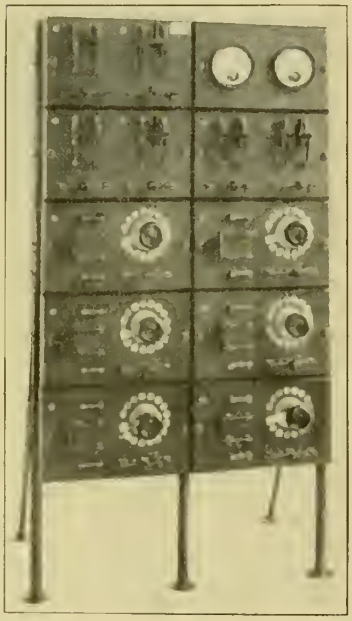
Glareless headlights was given considerable attention by the Society of Automobile Engineers at its winter meeting in New York City, January 5 and 6, at which the Electrical Equipment Division of the Society's Standards Committee is expected to make important recommendations bearing on the proper construction and application of headlights from the safety or non-glare standpoint. The engineers, among whom are numbered representatives of all the prominent manufacturers of automobiles and equipment in the United States, naturally regard the subject as one of the greatest importance to the industry and have had it under deliberation for more than a year. From their investigations it has developed that a reduction of glare and an improvement in effective lighting may result from improved methods of constructing both the bulbs and the reflectors in which they are mounted. At one of the society sessions Henry Schroader will read a paper on electric bulbs, explaining the characteristics of the tungsten filament, describing the latest tendencies in bulb usage and illustrating processes of manufacture.

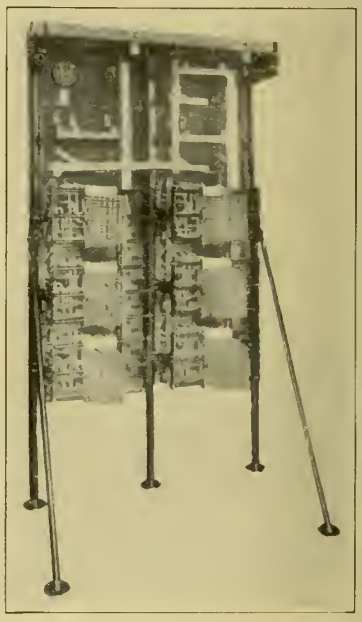
While considering methods of improving headlight construction with a view to more efficient and glareless illumination, the engineers have recognized that any formal measures, such as laws and ordinances, that may be framed with regard to the many thousands of automobiles now in use, must necessarily be so drawn as to be capable of fulfilment with a minimum of hardship upon present users, as well as a maximum effect upon public safety.

# BATTERY CHARGING OUTFITS
## *for*
# PUBLIC AND PRIVATE GARAGES

Outfits for public garages are furnished for any kilowatt capacity required. The charging panels are built to give the particular control of the charging circuits desired by the customer. Booklet 5030 illustrates and describes some of the equipments we have furnished. Send for a copy.

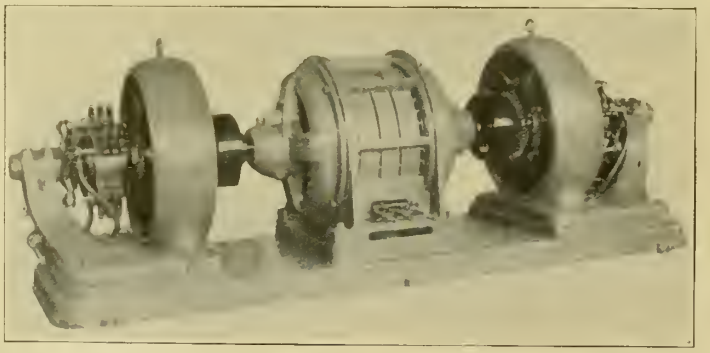
Smaller outfits which any woman can operate are designed particularly for charging your car while it stands over night in your private garage. These outfits are described in folder 4529, a copy of which is awaiting your request.





### SOME APPARATUS *for* A PUBLIC GARAGE

Motor-generator delivers current to the circuit panels, of which both front and back views are illustrated. These panels serve six constant potential charging circuits and six charging circuits with series rheostat current control. The voltmeter and ammeter are used to read the voltage and the current of each of the twelve charging circuits. The constant potential feature is maintained by TD voltage regulators in the generator control (not shown in the illustration). Write for Booklet 5030.



# GENERAL ELECTRIC COMPANY

FORT WAYNE DEPARTMENT FORT WAYNE, INDIANA

*Sales Offices in All Large Cities*

# Electric Truck "Prosperity"

The first practical gasoline automobile was built about 1886—the first real Electric truck 15 years later. Neither had much of a great demand success until 1909 or, say, 7 years ago. It takes time to introduce things so revolutionary.

The great bulk of the Electric trucks of the world have been built in the past *five* years. Each good Electric sold eventually sells two more, so production will increase rapidly once a certain distribution is reached.

Electric Truck "Prosperity" is here, already, for if you discount everything else, G. V. *reorders* alone would keep a big plant running. In addition there are thousands of business men who are being converted to the economic side of Electric trucking. Others are installing Electric trucks because this is in line with the entire electrification of their plant or store. Don't forget that the future of the Electric truck is limited only by the future of Electricity itself. The business man who claims that the Commercial Electric is "impractical", "no good", "needs a nurse" and so on, very frequently gets a short arm jolt when his competitor installs Electric Delivery.

G. V. Electrics have demonstrated over 10 years' life in hundreds of cases. They have covered as high as 21,000 miles each per year. They are efficient in hilly cities like Pittsburgh and Cincinnati. They are efficient in Winnipeg and Manila—two climatic extremes. Every so called weak point of the Electric has been given the lie in actual performance—*somewhere.*

Get the facts—you doubters—get the facts! *Specific adaptability* is all that is needed to place the Electric (the G. V. at least) absolutely at the head of efficient trucking. Let it be our pleasure to show you Why. Our new catalogue awaits your address.

*General Vehicle Company, Inc.*

*Long Island City, N.Y.*

*New York, Chicago, Boston, Philadelphia*

Copyright, 1915

2522




# PHILADELPHIA STORAGE BATTERY COMPANY

**Announcing Type WTXI**

A BETTER THIN PLATE THAN EVER

**GREATER MILEAGE**
**LIGHTER WEIGHT**
**LONGER LIFE**

STURDY "DIAMOND GRID" CONSTRUCTION

80 per cent of all 1916 Electric Pleasure Cars will be equipped with Philadelphia Diamond Grid Thin Plate Battery, Type WTXI

**PHILADELPHIA STORAGE BATTERY COMPANY**

Manufacturers also of the Famous "Diamond Grid" Starting and Lighting Batteries

ONTARIO and C STREETS PHILADELPHIA, PA.

*DEPOTS AND AGENCIES*

NEW YORK CHICAGO BOSTON ST. LOUIS ROCHESTER CLEVELAND DETROIT
DENVER KANSAS CITY, MO. CINCINNATI BUFFALO WASHINGTON MINNEAPOLIS
SALT LAKE CITY SAN FRANCISCO OAKLAND LOS ANGELES SACRAMENTO
SEATTLE PORTLAND, ORE. TORONTO PITTSBURGH

# The Ohio Electric



THE ENVIED
ELECTRIC

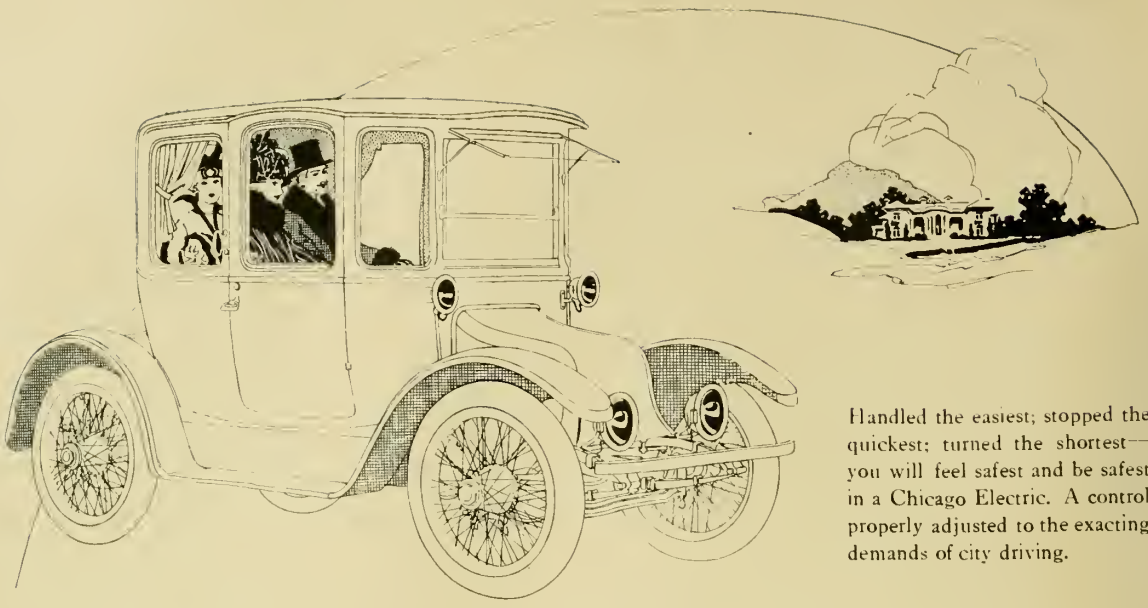
*Literature on request*

The Ohio Electric is designed for people whose judgment of artistic perfection is as keen as our desire to achieve it. To merit their approval, the car must be as flawless in an artistic sense as it is mechanically.

A lesser car, perhaps, must satisfy the multitude. But Ohio Electric ownership implies at once the power to appreciate perfection and the ability to possess it.

Each Ohio Electric is an individual product—finished, fitted and decorated to harmonize with the personality of the individual owner.

THE OHIO ELECTRIC CAR COMPANY, 1525 WEST BANCROFT STREET, TOLEDO, OHIO



Handled the easiest; stopped the quickest; turned the shortest—you will feel safest and be safest in a Chicago Electric. A control properly adjusted to the exacting demands of city driving.

CHICAGO ELECTRIC

We display these latest advancements in Electrics, known as Edison models, for the first time at the First Regiment Armory; space C-1, main floor, National Automobile Show, Chicago

*"The Best Built Electric in Chicago"*

*A Chicago Electric for Chicago People*

# *Chicago Electrics*

EDISON MODELS

## Prices $1,615 to $2,275

THESE new models represent the latest conception of approved closed car construction. Conventional lines, body low hung, give the long, smart effect so much desired by the discriminating users of fine motor cars.

DESIGNED in consultation with Thos. A. Edison's engineers for the use of the new G type Edison battery, these models will assure the most efficient results, whether equipped with Edison or the improved lead batteries.

RENTAL OF BATTERIES. This car offers as optional Rental Battery Service, eliminating the purchase of a battery and assures maximum battery service and full maintenance at a fixed low price per month.

THE strong financial standing of this company makes possible the offering of our deferred payment plan—$500 down—the balance $100 per month.

THE newest engineering developments have standardized this car and enable the highest grade construction to be offered at decidedly moderate prices.

# Walker Vehicle Company, Chicago

CHICAGO SALESROOMS
2700 Michigan Ave.
Telephone Calumet 3000

MANUFACTURERS OF
*Chicago Electric Passenger Cars and Walker Electric Trucks*

EVANSTON BRANCH
Clark St. and Benson Ave.
Telephone Evanston 481

# ELECTRIC VEHICLES

A MAGAZINE FOR THE ELECTRIC AUTOMOBILE OWNER. $1.50 PER YEAR. 1253 MONADNOCK BLDG.

Vol. 8 CHICAGO, FEBRUARY, 1916 No. 2



*Thos. A. Edison and his Detroit Electric*

# DETROIT ELECTRIC

The overwhelming demand for Detroit Electric Automobiles cannot be by accident or chance, but must be due to the merits of this beautiful car and to the service rendered.

A Detroit Electric reflects the good judgment of its owner. For the Detroit Electric has won its way to the supreme place in the enclosed automobile field, purely by reason of its quality.

It is the latest and best—in big things and little, in beauty and in mechanism, in equipment and in detail—of a Company which for years has confined its efforts exclusively to building high quality enclosed automobiles.

## Anderson Electric Car Company

**(Manufacturers Detroit Electrics)**

***World's Largest Builders of Enclosed Pleasure Cars***

Direct Factory Branch
2416 Michigan Avenue
CHICAGO, ILL.

CENTRAL DISTRICT

Factory Sub-Branches
MILWAUKEE, WIS.
SPRINGFIELD, ILL.
ROCKFORD, ILL.

# Electric Truck "Prosperity"

The first practical gasoline automobile was built about 1886—the first real Electric truck 15 years later. Neither had much of a great demand success until 1909 or, say, 7 years ago. It takes time to introduce things so revolutionary.

The great bulk of the Electric trucks of the world have been built in the past *five* years. Each good Electric sold eventually sells two more, so production will increase rapidly once a certain distribution is reached.

Electric Truck "Prosperity" is here, already, for if you discount everything else, G. V. *reorders* alone would keep a big plant running. In addition there are thousands of business men who are being converted to the economic side of Electric trucking. Others are installing Electric trucks because this is in line with the entire electrification of their plant or store. Don't forget that the future of the Electric truck is limited only by the future of Electricity itself. The business man who claims that the Commercial Electric is "impractical", "no good", "needs a nurse" and so on, very frequently gets a short arm jolt when his competitor installs Electric Delivery.

G. V. Electrics have demonstrated over 10 years' life in hundreds of cases. They have covered as high as 21,000 miles each per year. They are efficient in hilly cities like Pittsburgh and Cincinnati. They are efficient in Winnipeg and Manila—two climatic extremes. Every so called weak point of the Electric has been given the lie in actual performance—*somewhere.*

Get the facts—you doubters—get the facts! *Specific adaptability* is all that is needed to place the Electric (the G. V. at least) absolutely at the head of efficient trucking. Let it be our pleasure to show you Why. Our new catalogue awaits your address.

*General Vehicle Company, Inc.*

*Long Island City, N.Y.*

*New York, Chicago, Boston, Philadelphia*

Copyright, 1915

Published Monthly By
ELECTRICITY MAGAZINE CORPORATION
Monadnock Building
CHICAGO

Entered at Chicago Post Office as Second Class Mail Matter

# ELECTRIC VEHICLES

WITH WHICH IS INCORPORATED IGNITION
TRADE MARK REGISTERED IN THE UNITED STATES PATENT OFFICE

SUBSCRIPTION PRICE
Domestic - $1.50
Canada - - $1.75
Foreign - - $2.00

FOR SALE AT ALL NEWS STANDS

If Your News Dealer Will Not Supply You—Please Notify Us

Volume VIII | CHICAGO, FEBRUARY, 1916 | Number 2

# Woods Electric Now a Self-Charger

*Adds Gasoline Auxiliary Power and Bids Central Stations Good Bye*

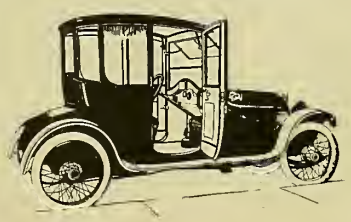
THE Woods Electric, one of the oldest and most conservative of battery propelled cars, has suddenly turned its back upon established electrical conditions. It has flaunted a declaration of independence in the face of the astonished central station. Hereafter, as one—only one—of a series of brand new stunts, Woods electrics will charge their own batteries, and keep them charged.

The new Woods as a commercial product is very new; so much so that not even a photograph of its body is in existence. But the test models, made practically according to the specifications which will be followed in the manufacture, have been demonstrating their peculiar ability and reliability to the Woods engineers for two years. Their performance, added to the obvious, common-sense value of the new principle, has induced the Woods company to discontinue the manufacture of the straight electric which has built up the reputation of the concern. The company will now make nothing but the new type.

The principle of the new car is so novel it is difficult to know just how to classify it or what to call it. The reason for this will become clear as this description progresses, and possibly a title will also suggest itself as the story unfolds. There are two points of view from which to consider the car—the gas car owner's and the electric car owner's; and the theory of the principle fits easily into either angle.

The electric car owner who knows anything about his property knows that if he could get his battery charged every few miles, or every time it needed it, or continuously charged, he would only need half as big a battery. Let him imagine, then, that he has discarded half his battery, and in its place installed a little gasoline engine and dynamo to charge the remaining battery. The next obvious step would be to discard the dynamo and use the vehicle motor, driven by the engine, as a dynamo. Put the engine and motor-dynamo on the same driving shaft, with only a magnetic clutch between them, arrange the controller so that the car may be driven by either the engine or the motor, and that when the engine is doing the driving it is also driving the dynamo and charging the battery, and you have a general idea of the Woods principle.

Let the gas car man, on the other hand, look at it this way: He already has as part of his car equipment a small storage battery and a dynamo-motor which charges the battery and starts the engine. Let him imagine that dynamo-motor increased in size until it is big enough to run his car, and the storage battery correspondingly enlarged. The gasoline engine could then be very much smaller, because it would not be used for starting and acceleration—the things that are responsible for all the excess power of the regular gas car. Assuming these conditions, we again see the Woods principle.



If any mystery now remains, perhaps a general description of the new Woods chassis will help dispel it.

The car is built on a wheel base of 110 inches, with wire wheels and Silverton cord tires as standard equipment. Under the rear hood is the 20-cell battery, with space left inside the hood for a spare tire—an unusual but desirable location. Under the front hood, which is that of a stream-line gas car, are the engine and dynamo-motor. The engine is a four-cylinder water-cooled unit of approximately ten horsepower—which has proven to be ample for all conditions and emergencies, as will be explained later. It is direct-connected through a magnetic clutch with the motor, both being on the direct driving shaft. This magnetic clutch consists simply of two iron discs. The one on the end of the engine shaft acts as a fly-wheel and the one on the motor shaft carries a small magnetizing coil, a slight current through which effectually locks the two discs together as one piece—thereby coupling the engine and dynamo-motor and the transmission shaft of the car.

The motor is a standard six-pole General Electric product of approximately the same size as used in a conventional electric car. Its only peculiarity is its adjustment to operate as an efficient dynamo or generator when driven by the engine. It is permanently affixed to the driving shaft, and runs—either as motor or generator—whenever the car runs.

The battery, as we said before, has twenty cells of the standard size formerly used in the forty-cell straight electric, and therefore is just half the former size.

The control mechanism exactly resembles the control mechanism of a gas car. It consists, in its visible parts, of a sector with two finger levers mounted above the steering wheel. The outer lever is the electrical controller, and the inner one controls the gasoline engine. The outer lever works directly through a rod in the steering shaft, on an electrical rheostat controller which governs all the necessary electrical connections. The inner lever has one electrical function: As soon as it is moved up from the neutral or dead position it actuates the magnetic clutch and connects the motor and engine. The motor turns over the engine and starts it in the usual gas-car manner. As soon as the engine is run-

ning at speed it turns the motor into a generator and charges the battery. At the same time the engine drives the car. However, when both levers are up, the engine and motor both drive the car, giving sufficient power and speed for any occasion.

The motor can drive the car alone, while the engine is still. The engine, however, cannot drive the car without also running the motor-dynamo and charging the battery. Every bit of power that is not used in driving is stored up in the battery. Coasting either down hill or on the level charges the battery.

Assuming the car to be standing still, the driver moves the outer, or electrical, finger lever, and the car starts as a pure electric, motor driven from battery. It quickly attains fifteen or twenty miles an hour, or whatever the desired speed may be. The driver may then continue to drive electrically; or he may move the inner lever and so start his engine. Both engine and motor are now driving the car. If road conditions are severe, or there is hill climbing to do, the dual drive may be continued. Otherwise the driver next moves the outer or electrical lever back to neutral. The engine is now driving the car and running the motor as a generator charging the battery.

The driver wishes to stop. He presses on the single foot lever which operates the brake. If the motor is driving, the first movement of this foot-lever shuts off the current. In any case it short-circuits the motor through a resistance, making a magnetic brake. Further movement of the brake-lever acts on the regular band brakes on the rear wheels and stops the car. If desired, the action of the car may be largely controlled with the foot lever. There is, of course, no clutch lever, because there is no clutch in the ordinary sense of the word. And as there are no gears, there is no lever corresponding to the gear-shift lever on a gas car. Even the braking for most stops is amply provided for by the reverse magnetic effect of the short-circuited motor when the finger-lever is moved back.

Reverse, which is purely electrical, is operated with a short heel-lever just back of the driver's foot. It simply reverses the electric motor without changing any shaft or gear connections.

There is always danger that a technical description will sound complicated. Whether this article conveys that impression or not, the fact is that the new car is much simpler than a gas car for this reason:

In the first place, it contains no mechanism that is not found in the modern gas car, except the simple rheostat controller and the reversing switch—and they take the place of a complicated change-gear transmission system. Carburetor and spark adjustments are unnecessary because the speed of the engine is constant within reasonable limits; that is, it is never called upon for sudden acceleration or change of load. And the engine cannot be stalled or "killed." If it stops it is instantly started again. The electric motor takes care of all that.

All the car contains that is not in the ordinary electric is the little engine—and that replaces twenty cells of battery. So far as control and operation go, the simplicity and reliability of the electric are retained—plus the automatic self-charging feature which not only assures a constantly charged battery and consequently the ability to go anywhere a gas car can go, but makes the battery practically fool proof. When the car is put away the owner knows the battery is charged without attending to it. In fact, the battery needs no more attention and is no greater responsibility than the storage battery in any gas car.

Simple meters on the dash keep the driver fully informed, at a glance, of all the conditions he needs to know.

The new model will first be made up as a four-passenger coupe. The worm drive and the body features that distinguished the Woods electric are retained. The lines, however, naturally more nearly resemble a gas car. An open model will doubtless follow the coupe shortly.

Every gas car man knows that only a small portion of the high power of his engine is used in simply driving the car. Even the big, heavy car with a sixty horsepower engine uses not over ten horsepower for straight driving. The rest is merely on hand for emergencies and the excessive demands of starting and acceleration. However, the consumption of gasoline naturally corresponds to the size of the engine and not to the amount of its power that is actually used.

The Woods test models which have been driven for hundreds of miles into the country about Chicago in all sorts of weather and road conditions have been making about thirty miles per gallon of gasoline—and meantime charging the battery for an additional ten or fifteen miles on the same gallon. This economy seems extraordinary and almost incredible; but it will be understood by any one who is familiar with the reasons for the regular gas car's extravagance.

This preliminary description of the new Woods car cannot pretend to be adequate, and will be followed shortly by a technical explanation by the company's chief engineer, which will be illustrated with photographs and diagrams. But even before that official article appears we think both electric and gas car men will agree that the Woods "automatic" car is the most interesting development of the season; for it seems to discard the disadvantages of both types and combine their advantages with surprising results.

---

G. M. Stadelman, sales manager for the Goodyear Tire & Rubber company, Akron, Ohio, was made vice-president at the annual meeting of the company. Mr. Stademan will continue as sales manager, while A. F. Osterloh, newly elected secretary, will also be assistant sales manager. P. W. Litchfield was also elected a vice-president.



*A One-Wheel Tractor Developed by the Walker Vehicle Company for Attachment to any Horse-Drawn Vehicle as Shown in the Illustration. This Device Solves the Problem of Low First Cost in an Electric Commercial Wagon and Should Prove Popular and Useful and a Good Missionary for Electric Vehicles.*

# The Problem of Cheap Garages

*How the Garage Owners Are Trying to Give Something for Nothing*

BY S. OLVENT

THE advantages of the electric car for city use for those who do not keep chauffeurs, but especially for ladies who want to go and come as they please and for gentlemen who do not like to tinker with an engine or repair tires, are so apparent as to need no mention; but first-class garages are absolutely necessary to secure adequate service.

The electric cars are beautiful, clean, commodious and convenient and usually run without trouble for several months; but by-and-by, unless they have been given intelligent care, troubles begin, especially with the battery, so that the owner finds his mileage growing less and less or is occasionally left upon the road without juice and is obliged to find his way home in the street car. This is particularly annoying after the false hopes raised by the misleading advertisements that say any one can drive an electric car and that the electricity costs only six or seven dollars a month and that it is continually growing cheaper. Dealers, in these statements, omit to say anything about mileage, while common experience has shown that including overheard charges even with good batteries, electricity costs $13 to $15 per month for any one who runs as much as 20 miles per day. Dealers usually fail to tell their customers that if the battery is charged every night they cannot expect it to last more than eight or ten months, and that the depreciation on the battery always amounts to 3 cents per mile.

When remonstrated with for making too rosy statements, salesmen have replied that their business is selling, they do not pretend to know anything about the car. It would appear much wiser for dealers to insist upon truthful statements by their salesmen, otherwise owners are disappointed and sooner or later either try a different make of car or resort to a gas machine.

After the first few months of service, electric car owners are often staggered by the cost of repairs, not so much from defects in the mechanism as from the unwarranted charges often made by cheap garages, to make up for their low rates for care.

Dealers and their employes not infrequently make the mistake of laying blame on the garage for all defects or accidents to an electric even if only a bulb is broken, a finger is burnt out, or anything goes wrong with the brakes; while there are ninety-nine chances out of a hundred that the garage was in no way responsible. As a result the owner complains to the garage, or refuses to pay his bill and the garage owner is antagonized.

Largely as a result of cheap garages and unfair treatment by dealers, electrics have been getting into disrepute and several manufacturers are devising other schemes or going out of business. There is no doubt that the electric vehicle would steadily grow in favor if the business interest of the garage owner, the manufacturer, and the dealer were properly co-ordinated and each regarded the interests of the other; but of all these the public garage has the most to do with the comfort of car owners. Some car owners, influenced by the misleading statements of the dealers' repairmen, try keeping their cars at home; but usually it is not long before they become disillusioned, unless they happen to have a peculiarly efficient chauffeur to take care of the machine. In any event, they find the cost of electricity from 20 to 25 per cent more than it would be in a public garage.

It costs twenty-five to thirty dollars a month to keep a small open gas car in a good garage, and these garages furnish nothing excepting storage and washing; they usually make considerable profits on gasoline, tires and other accessories. It is, therefore, surprising to find that some electric garage owners are offering to take care of electric cars for the same or slightly higher rates, and throw in gratuitously the electricity and hiking, which, on the average, costs more than $20 a month. Owners are often willing to accept this gratuity so long as the garage men are foolish enough to give it. In other words, if something is offered for nothing, they see no reason why they should not take it.

A couple of years ago it was proposed to build several large garages in Chicago that would accommodate from 200 to 250 cars each at a charge of only $25 per month; but the bubble soon burst when it was found that estimates of the room required were much too small and that adequate provision had not been made for the cost of electricity, hiking, and overhead charges. Nevertheless, only recently we have known a garage to offer to take care of an electric car and give full service for $25 per month, which would allow him only $5 for washing, general care, rent and overhead charges.



*Mrs. Harry M. McConnell and Mrs. Witt K. Cochrane with a Model 57 Detroit Electric.*

Some garage owners labor under the misapprehension that if they fill up their places with cars at very low rates, they will gain so much by numbers as to overcome the loss on each. There is no doubt but that in business that deals with scores or hundreds of thousands, the profits on a single item may be quite small, and yet the general results are good; but if a garage owner could fill his own place with 150 cars on which he might make $5 each, he would only profit $750 a month,

whereas if he had made $10 each on 100 cars he would gain $1,000 plus the saving in expenses. It should be remembered that as the number of cars increases beyond forty or fifty, the cost of service and electricity is correspondingly greater, so that the only chance for profit that can be counted on is saving in rent. As a result of this pernicious method of doing business, electric garages in this city are constantly changing hands or failing outright, without benefit to any one.

All have had glimpses of some of the phases of high finance, so admirably portrayed by H. G. Wells "Tono-Bungay," but few realize the extent of speculative activity in the little electric garage business, whereby certain operators, by taking in cars below cost, and by big talk fill up their places and then unload on some one who thinks he is buying a legitimate business.

The effects of these methods are not limited to garage owners but extend to manufacturers and dealers, whose business suffers from the disappointed owners, who, disgusted by their padded bills, turn to the gas machine, with which the days of loot are nearly passed.

Some car owners think that at the cheap garage they may estimate beforehand the cost of maintaining an electric; but they do not really learn until after some months, when they have figured up the extras for unnecessary repairs.

Is there any remedy for the cut-throat methods adopted by some garages? It goes without saying that all are striving to make a living; but unfortunately some have not learned that honesty, and fair dealing with their neighbors, is the best policy.

If the reputable garages in any section of the city would combine and charge living rates the business in that locality would be immediately lifted out of the muck into respectability.

Is there any way to eliminate the rate cutter who is the direct cause not only of his own undoing but also of the bad business conditions about him? It has been proposed that in each of these neighborhood associations every member put up security for keeping his agreement, and that a fine of fifty dollars be assessed for every infraction. To secure the success of this plan a reliable accountant should inspect the books of each member once a month. He would not reveal the condition of any one's business excepting in the one point of maintaining just rates.

If irregularities in charges were found, he would report them at once to a committee of the association, which would investigate and collect the fine, if a fault had been committed. Reports from customers would usually indicate the trail and it would not require more than an hour's work a month on any one's books. Some plan of this kind would remove suspicions and at once raise the garage interests to the plane of legitimate business and it would stimulate the electric vehicle industry, and greatly improve the service for owners of electric cars. Do it now.

## Demountable Rim Patent Valid

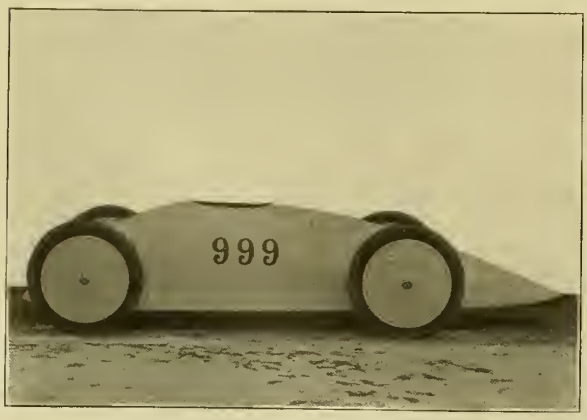
The United States Circuit Court of Appeals, Second Circuit, before Lacombe, Coxe and Rogers, Circuit Judges, Justice Lacombe presiding, has just handed down a decision affirming the decision of Mr. Justice Hunt, C. J., in the United States District Court, who declared the Perlman demountable rim patent valid, and infringed by the Standard Welding Company of Cleveland, Ohio. An injunction and accounting order against this company was issued last August by the lower court.

The Perlman demountable rim patent case is of more than ordinary interest because it affects the use of demountable rims on nearly all the automobiles made and now in service in this country.

The Perlman demountable rim patents were applied for in 1906, and the patent was finally granted after many years of delay in the Patent Office, on February 4, 1913.

Perlman, however, was not behind these delays, for both he and his attorneys were insistent upon a prompt issue of the patent, because tire and rim makers and automobile manufacturers knew of his invention and had appropriated it pending the issue of his patent.

Meanwhile, the demountable him business has grown in greater proportion than any other part of the automobile industry, by reason of its intrinsic value, usefulness and time-saving advantages.



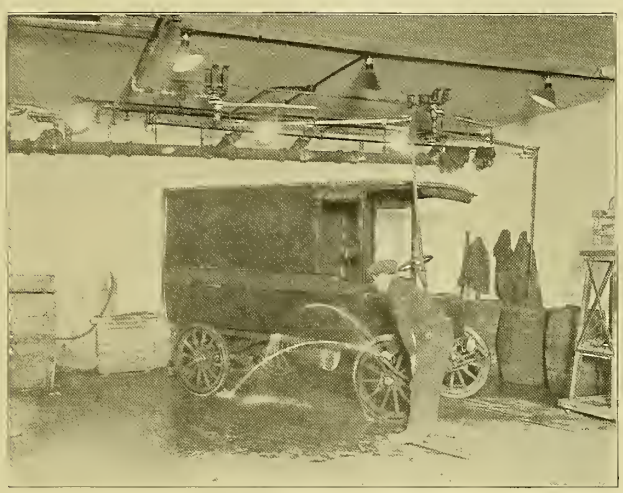



*This is the speediest electric ever built. At the time it was made it held the world's record for speed. The car is the Baker Electric "Torpedo Kid" which made a record of a mile in 56 seconds at Ormond Beach, Florida. The car was designed by Mr. Walter C. Baker, the creator of the first American-made electric. In design the "Torpedo Kid" resembles a pear cut in half. The creator of this car made it in this shape after studying the form which a drop of oil took in falling through the air. He observed that the drop was not round, but took the form of an ellipse. From this study of the drop of oil Mr. Baker arrived at the conclusion that a solid body of the same shape cut in half and built low to the ground would offer the least possible wind resistance. That this theory is correct is proven by the fact that practically all racing automobiles from that day to this have more or less followed this principle of design. The Baker R. & L. Company no longer races any of its cars, although it has a larger car, similar to the "Torpedo Kid," the speed of which has never been determined. It has been run, however, at the rate of 120 miles an hour. A few years ago this car was entered in some races in France, but unfortunately it got out of control of the driver and ran amuck, injuring several bystanders.—Electric City Magazine.*

# The Horse an Unprofitable Servant

*Faithful But Uneconomical and Inefficient Animal Power Supplanted by Motors*

FAR sighted people who have studied horse and motor traffic conditions in this country for the past few years, have confidently pronounced the doom of the horse in the commercial field. This may seem to be a rather broad statement considering the fact that there are over twenty-six million horses and draft animals in use in the United States at the present time, and that there are approximately only one hundred thirty thousand mechanical vehicles and sixty thousand tractors used. While motorized equipment is supplanting the horse in some of our largest cities where traffic conditions demand greater speed and efficiency, there are ten million horses distributed among the urban districts of the country in cities and towns of more than one hundred. It is difficult for those who live in large cities and constantly see thousands of motor vehicles doing the work that was done by horses ten or fifteen years ago to realize that only a very small percentage of horses have been displaced by motor equipment.



*The Electric Requires Only the Space It Occupies and When the Wagon Is Washed the Cleaning Job Is Ended.*

It is estimated by G. Arthur Bell of the Bureau of Animal Industry of United States Government, that there are approximately 100,000,000 horses in the world. Of this number the United States possesses 24,000,000 or practically one-fourth.

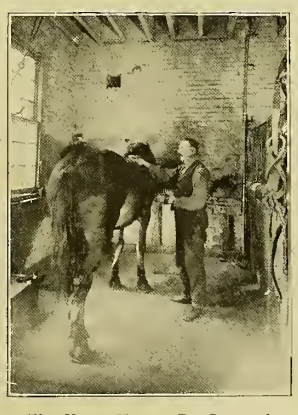
A complete revolution from horse-drawn to motorized traffic will take time and the experience of the more progressive to educate and convince the general public. Every means should be brought to bear to hasten this change for the city horse is the greatest economic waste today in this country. For the ten million horses used in our cities and towns consider the enormous amount of labor devoted to their care and upkeep and the cost this entails.

The government estimates that the average food consumption of a horse is ten pounds for every hour he works or a total of between 12,000 and 14,000 lb. per year, which is the average production of five acres of average agricultural land in the United States. It costs about 90 cents a day merely to feed a large draft horse. Shoeing a draft horse in urban service costs about $30 a year. It is said that the iron alone that is hammered by blacksmiths in the United States into horse shoes in one year is sufficient to make 40,000 farm tractors or 60,000 motor trucks.

In order to maintain sanitary conditions in our cities, thousands of stables and street cleaners must be employed, another item of expense chargeable to the maintenance of the city horse, approximating $10 per horse per year. In addition consider the tremendous amount of labor expended in hay making and corn growing, the labor of mechanics who make "horse feeding" machinery of which a conservative estimate would amount to about $50 per year per horse. A recent government report states that the horse averages but four hours of useful work per day in city service. For 300 working days (which is a very high average) his labor is valued at not more than $3 per day, the figure at which horses are hired to the public. At $3 per day for 300 working days the horse gives a total service of $900 per year. Now let us see what he costs.

COST PER YEAR.

| | |
|---|---|
| Cost of the horse (government estimate) | $110 |
| Wagon | 100 |
| Driver's wages | 300 |
| Feed | 157 |
| Shoeing | 30 |
| Stablemen's time | 40 |
| Veterinary service | 5 |
| Insurance (horse) | 2 |
| Insurance (stable) | $ 7 |
| Taxes on stable and horses | 6 |
| Stable supplies | 16 |
| Harness | 25 |
| Depreciation | 22 |
| Labor of growers of feed, makers of wagons, plows, etc.. | 50 |
| Sanitary labor | 10 |
| Total | $880 |



*The Horse Has to Be Groomed.*



*The Harness Has to Be Cleaned.*

In some lines of business a horse's useful life does not exceed three years. Compare this with the longevity of the electric truck, for example, which is from ten to fifteen years. The total expenses which this country

assumes for the ten million horses in use in our cities and towns is in excess of $7,400,000,000.

The economic waste resulting from feeding the total of twenty-six million horses and draft animals in the United States is practically impossible to calculate. Using the government's estimate that one horse requires five acres of land for his upkeep and the fact that five acres of land devoted to food products can be made to feed five people per year, the result shows an acreage sufficient to maintain a population of 125,000,000 people that is now being devoted to the raising of horse feed, or an acreage nearly equal to the combined areas of New York, New Jersey, Massachusetts, New Hampshire, Maine, Vermont, Rhode Island, Delaware, Connecticut, Pennsylvania, and Ohio. To feed these 26,000,000 horses it costs $2,000,000,000 annually, or a sum equal to the operating expenses of 250,000 miles of railway in the United States.

R. W. Hutchinson, Jr., in a recent article in *Collier's Weekly*, states that a horse requires 750 cubic feet of space. With his adjuncts, including seed room, harness room, wagon room, an additional space of 2,500 cubic feet is required, or a total of 3,250 cubic feet per horse. In cities, which average about 10 cents per cubic foot for housing horse and vehicle units, this implies a total investment of $2,875,000,000 to shelter the ten million horses. If the acreage devoted to stabling in our cities and towns were used to house human beings, or for industrial plants, the value would increase 50 per cent. In addition to this, all real estate contiguous to stables suffers a 50 per cent depreciation.

When we consider that five electric vehicle units, for example, could be garaged in the same cubic space required for one horse and wagon and adjuncts, it is apparent that there are enormous possibilities not only to manufacturers of such vehicles and to electricity supply companies, but for greatly improved traffic conditions, and better sanitary conditions, all of which make for greater efficiency and economy. Among some of our largest cities, New York, for instance, reports 128,122 horses; Chicago has 68,050 horses; Philadelphia has 50,461 horses, while St. Louis reports 27,182 horses. In Boston there are 22,997 horses and in Cleveland 16,839. Pittsburgh has 12,832 and many cities report from 8,000 to 10,000 more. There are scores of cities having 5,000 and 6,000 and but few of 25,000 inhabitants where the number of horses is less than 1,000.

Were New York City alone to be electrified to the exclusion of all other cities, it would take the present makers of electric vehicles using their present facilities approximately five years to make the change. It would take these same builders five more years to build enough vehicles to replace those that might be worn out at the end of ten years' service. Each horse now in use in our cities means a possible minimum yearly income to the electricity supply companies (central stations) of between $80 and $100 if replaced by an electric vehicle. In New York City, for example, there is a minimum of something over $10,000,000 annually to be derived from the sale of current for electric vehicles in the place of horses.

Of the ten million horses in use in our cities, probably all could be successfully displaced by electric vehicles. This would mean an additional income to some six thousand electricity supply companies of about one billion dollars. This is all the more significant when we consider that the combined income of all these central stations from all sources last year was approximately $450,000,000, of which but a very small percentage was derived from the sale of current for electric vehicle charging.

Even if only a small fraction of the business in sight were obtained it would represent a tremenodus increase in the total incomes to the electricity supply companies.

Aside entirely from the gain to be derived by manufacturers of electric vehicles, electricity supply companies, and users, in a change of this nature, is the sanitary aspect of the situation. It is said that over 100,000 people in this country die yearly by so-called "horse-caused" diseases. Every spring comes the campaign against the housefly and we hear repeated the slogan of "Swat the fly," but very little is said about destroying the source of the danger associated with the fly. We know that a fly would be perfectly harmless were it not for the disease germs that it carries around and as long as we have stables near city dwellings and unsanitary streets, the fly will continue to be a disease carrier and a pestilence.

Municipalities should recognize this fact and take the initiative in exterminating the city horse, substituting motorized vehicles in all municipal departments where vehicles must be used. Many cities are recognizing the superiority of the electric over horse-drawn equipment by using them in fire department service, for collection of refuse, in street sprinkling, ambulances, mail and for city officials, etc. The Electric Vehicle Association of America has taken an active part in the efforts to electrify the fire departments of various cities and it is gratifying to note the ever-increasing number of electrics being used in this particular service in many of our large cities.

In connection with the sanitary aspect of the city horse situation, and in order to rid their cities of one of the greatest sources of economic waste, the Electric Vehicle Committee of the Incorporated Municipal Electric Association of Ipswich, England, which works in cooperation with the Electric Vehicle Association of America, recently sent the following letter to city officials, borough surveyors, officers of health, tramway managers, officers of fire brigades, superintendents of refuse disposal departments, gas engineers, water engineers, etc.

"The Manchester Corporation, city authorities, have recently served notices upon a large number of owners and tenants in the city to abate an alleged nuisance by discontinuing to keep horses on their premises. It is likely that this commendable action by the sanitary committee of the Manchester Corporation will be followed by other progressive cities and towns, since it is admitted by all who are qualified to give an opinion that the presence of stables in urban areas is harmful to the public health.

"If horses are to be displaced in this way, motor traction in some form will have to be adopted.

"From the standpoint of public health, the gas vehicle is also most objectionable, owing to the noxious gases emitted by the exhaust, and also the nerve-racking noises caused by the engine and gears, especially at central garages.

"On the other hand, the electric battery vehicle is in every way an ideal vehicle for town use. It is odorless, silent, and by far the cheapest to run. It also causes considerably less road wear than the gas vehicle.

"My committee therefore suggests that municipalities should make special efforts to encourage the use of the electric battery vehicle in the area under its control. The most convincing way of doing this is to set the example by house refuse removal, cartage of road and other materials, ambulance work, fire brigade work, cartage of coal and ashes, as well as for passenger transportation by means of electric battery omnibuses. Smaller electric vehicles can also be used to advantage for the transportation of officials in performance of their duties.

"Not only will the adoption and use of electric vehicles in these directions gradually have the effect of doing

away with stables, but it will, in addition, bring a handsome revenue to the electric supply undertaking which nearly every municipality nowadays owns.

"My committee wish particularly to emphasize the point that there is nothing experimental about the modern electric vehicle. It has been evolved out of years of experience. Many thousands are now in use in America, and the results obtained there prove that, as regards low running cost and reliability, it cannot be approached by any other system of road haulage.

"It also has the added merit of depending for its source of energy upon the natural fuel of this country, i. e., coal.

"In bringing the above facts and suggestions to your notice, my committee have every confidence in asking you to give them your careful consideration and to examine for yourself the examples of electric vehicles that are daily becoming more numerous in this country."

It is a very significant fact that in spite of the war on the continent England is active in the attempt to further the plain every-day commercial inerests of her cities and towns. Prior to the outbreak of the war a comparatively small amount of electric vehicle promotion work had been carried out in England, and not much progress had been made. When war was declared and all available horses were sent to the front and thousands of gasoline cars were commandeered, merchants were promptly acquainted with the advantages of the electric commercial vehicle as a medium of transporting merchandise and a number of large installations were promptly made. These installations have been so eminently successful that many additional concerns are substituting the electric for horse-drawn and gasoline equipment. When the war is over and business conditions are righted, it seems likely that the electric vehicle will have become recognized as the car par excellence for city and suburban work. A bright future for the electric vehicle is apparent to anyone familiar with traffic conditions in English cities with the very high cost of gasoline and the very low cost of electricity. The *London Electrical Times* of November 25 states that the firm of Messrs. Harrods, Lt., of Brompton Road, has recently installed a fleet of no less than seventy electric vehicles, displacing its entire horse equipment and several petrol cars which it formerly operated.

These electric vehicles will have a life of from ten to fifteen years more, while the great numbers of gas cars imported for war purposes has a life of only a very few months. With horses being destroyed by the thousands in the war districts, the very finest that money and breeding can produce, it would seem that if the war lasts a year longer the equine race must be practically exterminated on the continent. In twelve months over 300,000 horses and mules were shipped from this country to the countries at war, total value of which was approximately $70,000,000. While this does not make much of a dent in our millions of horses so far as numbers are concerned, it will exert a powerful influence upon the future price of good horses. The war is not over yet, and after peace treaties are signed the export of horses will continue as the countries in conflict will not have sufficient horses to even till the soil. Horse values will, without doubt, increase from 25 per cent to 100 per cent in the next two years, and both the merchant and farmer will be forced into mechanical trucking. These conditions afford an opportunity to demonstrate the general efficacy of the electric vehicle, and the English municipalities seem to have already recognized its superiority.

In time this country must do the same, and through the efforts of such organizations as the Electric Vehicle Association of America, the public must be made to realize that the ten million horses now used in our cities and towns must be supplanted by the more efficient economic electric. The "animal motor," still used for the transportation of 85 per cent of the tonnage of this country, recognized by scientists to be the poorest motor ever built, is yet an unrealized source of waste. But the day of the horse for commercial purposes is fast passing. It is no longer a "profitable servant."

## Boston Has Big Automobile Show

When the public is afforded a chance to peer into Mechanics building, the home of the Boston automobile show, which opens March 4, there will be a greater number of motor cars and commercial motor vehicles on display than any other show in the United States or in any other country can boast of. One month before the date of opening, the official list shows many cars in excess of those displayed in either New York or Chicago with more than a score of pleasure car dealers and manufacturers clamoring for a chance to display their goods.

Manager Chester I. Campbell is at work endeavoring to rearrange the space in the balconies so as to make room for more cars. The accessory space has been sacrificed to make room for automobile displays. At least ten different displays will be located in the balconies. Although considerable flooring has been taken from the accessory department, yet over 175 individual exhibits will be made in that section of the show. Scores of applications for space in the accessory department have been passed up because of lack of room.

The official list at this time shows 107 different makes of pleasure cars and commercial vehicles. Seventy-four of this number will be displayed of pleasure cars. There will be thirty-three different makes of trucks exhibited. In all probability there will be at least ten more added to the pleasure car list before the show opens.

## Milburns for the Orient

Light electric vehicles are becoming highly popular in many countries where they were scarcely known a year ago, according to Horace Suydam, president of the Milburn Wagon Company, builders of the Milburn light electric.

"In addition to shipments made to Russia and Australia our company has recently forwarded to China nine light electrics," states Mr. Suydam. "The order from the Orient was the direct result of the satisfactory service rendered by the Milburn electrics that were delivered a few months ago to the Shanghai Municipal Council.

"The export business of the Milburn company has grown to such proportion in the past six months that an inquiry was made to find out why the Milburn was preferred to other makes of electrics.

"Advices from China informed the company that the light weight of the Milburn was admirably suited for the soft roads that are everywhere in evidence. Heavy cars find it hard going, while the light electrics are able to glide over the soft roads without sinking in the mud."

When meeting fellow motorists in trouble on the highway, stop and offer assistance. Your turn may be next.

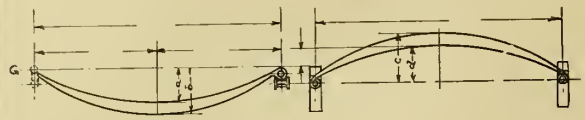



Fig. 9

*If spring is hung under axle fill in dimension a.*
*If spring rests on axle fill in dimension b.*
*If spring is hung under bracket fill in dimension c.*
*If spring rests on bracket fill in dimension d.*
*Give lengths and shapes of all spring seats.*

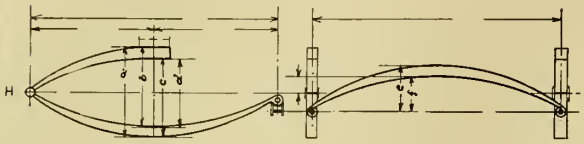



Fig. 10

*If spring rests on axle and is hung under bracket fill in dimension a.*
*If spring is hung under axle and bracket fill in dimension b.*
*If spring rests on axle and bracket fill in dimension c.*
*If spring is hung under axle and rests on bracket fill in dimension d.*
*Give lengths and shapes of all spring seats.*
*If spring is hung under bracket fill in dimension e.*
*If spring rests on bracket fill in dimension f.*

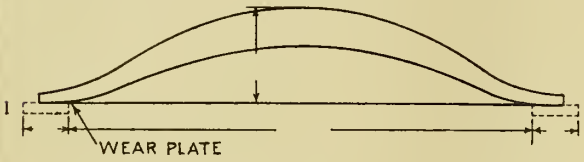
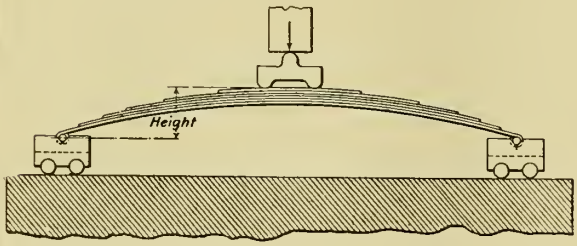
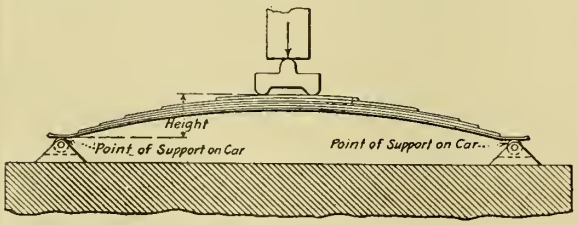



Fig. 11

*Give length and shape of spring seat.*




Figs. 12 and 13. Half-Elliptic Spring Compression Test Support.

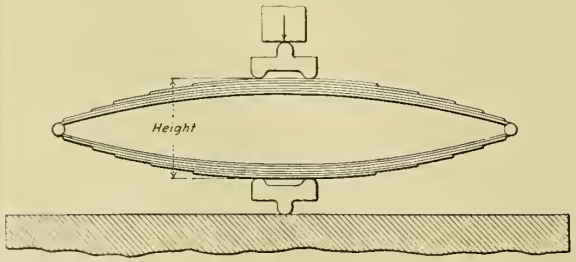



Fig. 14. Full Elliptic Compression Test Support.

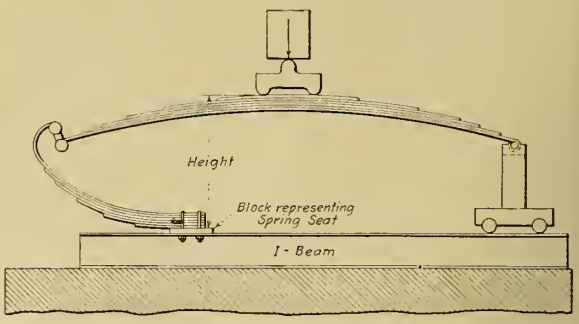
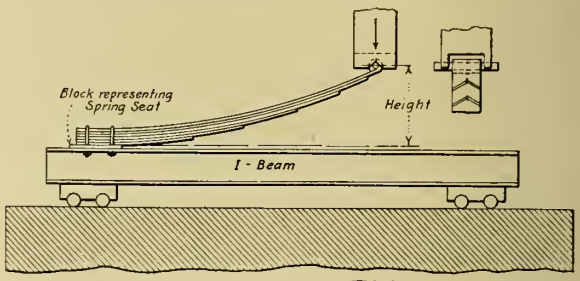
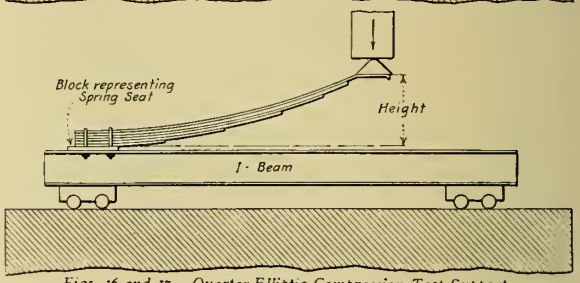



Fig. 15. Three-quarter Elliptic Compression Test Support.




Figs. 16 and 17. Quarter-Elliptic Compression Test Support.

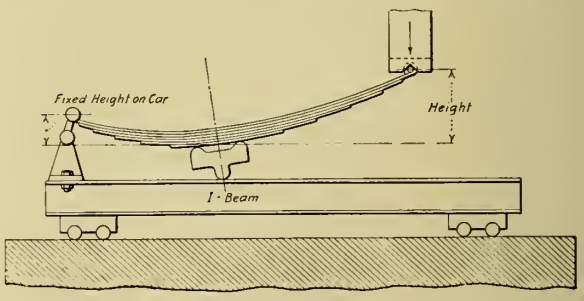



Fig. 18. Cantilever Spring Compression Test Support.

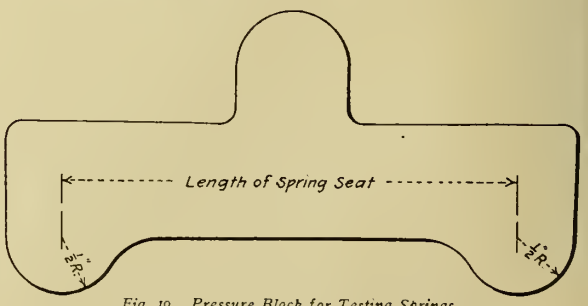



Fig. 19. Pressure Block for Testing Springs.

# Suggested Specifications for Springs

*Committee Report to the Society of Automobile Engineers*

THIS report has been submitted for discussion and is not in effect until adopted by letter ballot of the society.

SECTION I. BASIS OF PURCHASE

(a) These specifications cover all leaf springs for automobiles.

(b) Springs shall be made of carbon steel bars, conforming to the requirements of standard S. A. E. specification No. 1095 for carbon steel bars, unless alloy steel bars are specified by the purchaser.

(c) When alloy steel bars are specified, the manufacturer and the purchaser shall agree upon the type and grade of the bars, which shall conform to the standard S. A. E. specifications for chromium-vanadium steel bars, No. 6145 or No. 6150, or to the specifications for silico-manganese-steel bars, No. 9250 or No. 9260. Other steels shall be a matter of agreement between the purchaser and manufacturer.

(d) Information given the manufacturer by the purchaser should also comply with the provisions of the following section.

SECTION II. SPRING ORDER SPECIFICATIONS

(a) Type of Car.....

(b) Type of Spring { Front / Rear

(c) Material .....

(d) Type of Leaf Points.....See diagrams¶

(e) Width of Leaf { Front ..... / Rear ..... / Transverse .....

(f) Method of clamping spring in center { Bolt / Nibs / Band } See "Center Bolt" § and "Shrunk Band" ¶ specifications

(g) Type of Eye { No. 1 Eye formed with main leaf. / No. 2 Eye formed with main leaf and other leaf or leaves. / No. 3 Eye formed by welding and drilling. / a. In. / b. Out. }

Fill in by number and letter

| | Front Eye | Rear Eye |
|---|---|---|
| Front spring..... | | |
| Rear spring..... | | |
| Transverse spring..... | | |

(h) Material .....

Eyes

Bushed

Outside diameter of bushing=I. D. + ¼" } Not Reamed

Inside diameter .....in. } Reamed

Not Bushed

Inside diameter .....in. } Reamed / Not Reamed

(i) Rebound Clips. Number.....

Type { Clinched / Bolted

| (j) Weight carried above springs. | On front spring right | On front spring left | On rear spring right | On rear spring left |
|---|---|---|---|---|
| Car empty | .....lb. | .....lb. | .....lb. | .....lb. |
| With max. load | ...lb. | .....lb. | .....lb. | .....lb. |

(k) Distance between two most adjacent parts liable to strike, measured under maximum load..... { Front ..... in. / Rear ..... in.

(l) Do springs take driving effort?.....

(m) Do springs take braking effort?.....

| | Front | Rear |
|---|---|---|
| (n) Shackles { Under Tension / or Compression } | | |

(o) Additional information.....

.....

(p) To be left to the springmaker.

1. Number of leaves.
2. Gage of steel.
3. Type of leaf point.
4. Type of rebound clip.

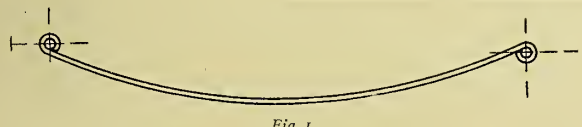


*Fig. 1*

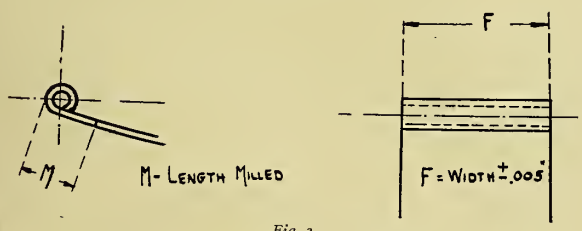



*Fig. 2*

*All dimensions to be given under full passenger or merchandise load.*
*Designate front end of spring by letter "F."*
*Give tolerances in dimensions when possible.*

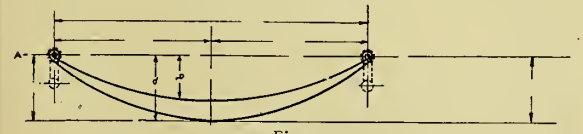


*Fig. 3*

*If spring rests on axle fill in dimension a.*
*If spring is hung under axle fill in dimension b.*
*Give length and shape of spring seat.*

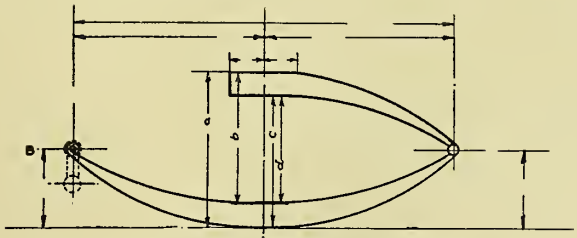


*Fig. 4*

*If spring rests on axle and is hung under bracket fill in dimension a.*
*If spring is hung under axle and bracket fill in dimension b.*
*If spring rests on axle and bracket fill in dimension c.*
*If spring is hung under axle and rests on bracket fill in dimension d.*
*Give lengths and shapes of all spring seats.*

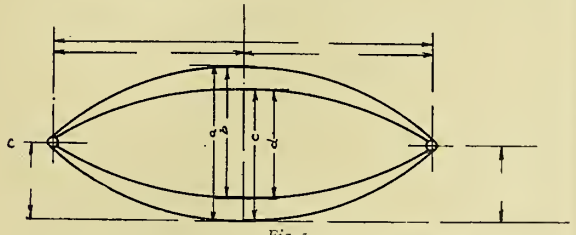


*Fig. 5*

*If spring rests on axle and is hung under bracket fill in dimension a.*
*If spring is hung under axle and bracket fill in dimension b.*
*If spring rests on axle and bracket fill in dimension c.*
*If spring is hung under axle and rests on bracket fill in dimension d.*
*Give lengths and shapes of all spring seats.*

5. Position of rebound clip (within certain limits).
6. Type of eye.

SECTION III. CHEMICAL PROPERTIES AND TESTS.

*Check Analyses:*—(a) A check analysis may be made by the purchaser of each size of spring steel bar involved. This analysis shall conform to the requirements specified in (b) and (c) of Section I.

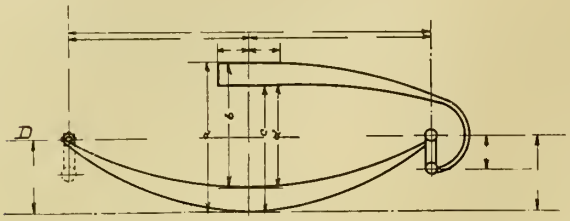



*Fig. 6*

*If spring rests on axle and is hung under bracket fill in dimension a.*
*If spring is hung under axle and bracket fill in dimension b.*
*If spring rests on axle and bracket fill in dimension c.*
*If spring is hung under axle and rests on bracket fill in dimension d.*
*Give lengths and shapes of all spring seats.*

(b) In case samples for analysis from finished springs are required, such samples shall be taken from a portion of the plates where the cross-section has not been changed from that of the original bar, and shall represent such full cross-section.

SECTION IV. PHYSICAL TESTS, INSPECTION AND REQUIREMENTS

*Workmanship:*—(a) The purchaser or his representative may examine all springs in each lot for workmanship, general dimensions and physical properties as specified.

(b) The springs shall be submitted for inspection complete, in the condition required by the drawings and shall conform to such drawings, within the variations allowed by these specifications. Dimensions which affect the contour only and not the interchange or service of the springs need be approximate only.

(c) The springs shall have the leaves uniformly graduated in length, properly bent and fitted reasonably true to curves given in the drawings. These curves shall be agreed upon by purchaser and manufacturer.

*Test Springs:*—(a) From each lot of springs which has met the requirements of Paragraph 4, the purchaser or his representative may select for physical tests, at least 25 per cent, to be tested preferably in accordance with the "Compression" Method of Paragraph 7.

(b) If any of the springs representing a lot fail to meet the requirements as to physical properties specified

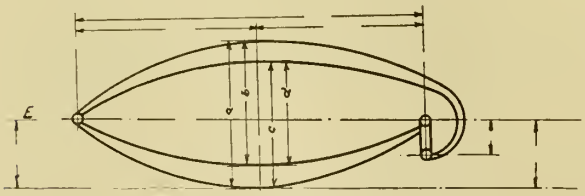



*Fig. 7*

*If spring rests on axle and is hung under bracket fill in dimension a.*
*If spring is hung under axle and bracket fill in dimension b.*
*If spring rests on axle and bracket fill in dimension c.*
*If spring is hung under axle and rests on bracket fill in dimension d.*
*Give lengths and shapes of all spring seats.*

in Paragraph 7 or 8 as required, but at least half of the springs representing a lot do meet these requirements, each spring shall be tested and those which meet the requirements shall be accepted. If more than half of the springs representing a lot fail to meet the requirements as to physical properties specified in Paragraph 7 or 8 as required, the lot represented may be rejected. The number representing the lot must be at least 25 per cent of the lot.

*Physical Tests: Method of Supporting and Measuring:*—(a) Full elliptic springs shall be tested in the upright position, one-quarter elliptic, half elliptic, three-quarter elliptic, three-quarter elliptic and cantilever springs are to be tested in the inverted position and must be so supported as to give free lateral movement on compression. Methods of supporting and measuring the various types are illustrated diagrammatically in Figs. 12 to 18.

(b) The anvil or pressure block of the testing machine shall be formed as in Fig. 19.

(c) Unless otherwise specified, all measurements of height are to be made as follows: In half-elliptic springs (Figs. 12 and 13) between the surface of the pressure block and a line joining the centers of the eyes (or through the points of support where there are no eyes); in full and three-quarter elliptics (Figs. 14 and 15) between the surfaces of the upper and lower pressure blocks; in one-quarter elliptics (Figs. 16 and 17) between the center of the eye (or point of support where there is no eye) and the supporting pad of the spring, measured at right angle to the surface of the latter; and in half-

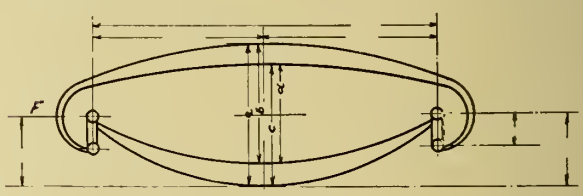



*Fig. 8*

*If spring rests on axle and is hung under bracket fill in dimension a.*
*If spring is hung under axle and bracket fill in dimension b.*
*If spring rests on axle and bracket fill in dimension c.*
*If spring is hung under axle and rests on bracket fill in dimension d.*
*Give lengths and shapes of all spring seats.*

elliptic cantilevers (Fig. 18) between the center of the floating eye and a horizontal plane passing through the lower surface of the spring (in inverted position) at the center-bolt.

(d) In conducting tests, all measurements of height shall be taken to at least the nearest 1/64 inch. All readings of load shall be taken to at least the nearest five pounds.

*Physical Tests: Compression Method:*—(a) *Free Height:*—The spring shall be placed in the testing machine, as specified in Paragraph 6, and a test load of 200 per cent of the specified working load* applied, then fully released three times and the height measured. This shall be known as the "free height."

All of the tests specified in Paragraph 7 can be accomplished in the fewest consecutive readings by using the following routine, observing all of the necessary precautions:

Apply 200 per cent of specified working load or deflect to limit possible on car and release fully three times. This gives the free height (7a).

Apply 75 per cent of specified working load (7c and 8a).

Apply specified working load for determination of loaded height (7b).

Apply 125 per cent of specified working load for determination of rate per inch (8a).

*Should the deflection corresponding to 200 per cent of specified working load exceed the maximum possible deflection on the car, a load corresponding to that required to give the maximum possible deflection on the car shall be used in place of the 200 per cent load.

Apply 200 per cent of specified working load or deflect to limit possible on car (7c).

Release fully and apply 75 per cent of specified working load for determination of permanent set (7c).

If necessary apply 200 per cent of specified working load or deflect to limit possible on car twice for further permanent set (7c).

(b) *Loaded Height:*—The specified working load shall then be gradually applied and the height measured without rapping or otherwise disturbing the spring. This shall be known as the "loaded height" and in case of pleasure cars shall not be less but may be ¼ and ⅜ inch more than that specified for front and rear springs respectively.

*Loading Precautions:*—Should the specified working load be accidentally exceeded in conducting the test for loaded height, the measurement of height should not be made after merely releasing the load to the specified figure, but the load should be removed to not over one-half the specified working load, after which it is to be again brought up without rapping or otherwise disturbing the spring, to the specified figure at which measurements are to be made.

(c) *Permanent Set:*—When the loaded height has been determined, the spring shall be fully released and then its height at 75 per cent of the rated load measured as in the previous methods. Following this the spring shall be compressed to 200 per cent of the specified working load,* fully released and the 75 per cent load again applied and the height of the spring again measured. Any difference between the first and last heights thus found is the permanent set, and this shall not exceed 1/16 inch. If there is a permanent set which does not exceed 1/16 inch the spring shall be loaded twice to 200 per cent of the specified working load* released, and the permanent set again measured. There shall be no increase in the permanent set.

*Physical Tests: Rate Per Inch of Flexibility:*—(a) When the rate per inch or the flexibility is specified, this should be given in pounds per inch. This should be determined by taking the height at 75 per cent and at 125 per cent of the rated load and by dividing the difference in load by the difference in height. The resulting figure gives the rate in pounds per inch, or flexibility. This figure shall not vary from that specified more than 5 per cent plus or minus.

*Reworking:*—Any springs which fail to meet the requirements of these specifications as to dimensions or tests may be again submitted after being remade by the manufacturer, such remaking to consist of insertion of new leaves or of annealing, reforming and retreating of old leaves. No springs shall contain cold reworked leaves.

SECTION V. MARKING.

(a) The name or brand of the manufacturer, the year and month of manufacture, and if specified the purchaser's class or part number shall be legibly stamped on each spring at a place not detrimental to the life or service of the spring, on the exposed end of the compression side of a leaf.

(b) Any stamping by the inspector shall be so placed as not to be detrimental to the life or service of the spring.

SECTION VI. INSPECTION AND REJECTION.

*Inspection:*—The inspector representing the purchaser shall have free entry at all times while work on the contract of the purchaser is being performed, to all parts of the manufacturer's works which concern the manufacture of the springs ordered. The manufacturer shall afford the inspector, free of cost, all reasonable facilities to satisfy him that the springs are being furnished in accordance with specifications. All tests (except check analyses) and inspection shall be made at the place of manufacture prior to shipment, unless otherwise agreed, and shall be so conducted as not to interfere unnecessarily with the operation of the works.

*Rejection:*—Unless otherwise specified, any rejection based on analyses made in accordance with Section III shall be reported within a reasonable time from the receipt of samples.

*Rehearing:*—In case of dissatisfaction with the results of the analysis, the spring manufacturer may make claim for a rehearing within two weeks. Samples rejected in accordance with Section III shall be preserved for this length of time.

Respectfully submitted for approval as standard practice.

*See note following 7 (a).

## New York Edison Issues Interesting Booklet

"Some Pictures and a Few Words" is the title of a new booklet produced by the New York Edison Company, which sets forth pictorially the advantages of the electric automobile over the horse-drawn vehicle. No end of material has been written on this subject and volumes of statistics prepared, but practically the whole story is told simply and graphically in a score of pictures in this little book which has not a line of copy except the captions of the pictures. Nothing could be more convincing or vivid than the photographic evidence which it contains of the superiority under all conditions of the electric over the horse and wagon in delivery service. The keynote of the whole proposition is comparative economy, economy in operating cost, in care, in room occupied when not in use, in space occupied at the loading platform or at the curb and in dependability under adverse weather conditions. The book is the collaborated effort of the automobile and advertising bureaus.

## Milwaukee Show Gets Crowds

The eighth annual show of the Milwaukee Automobile Dealers', Inc., opened January 8 in the Milwaukee Auditorium and attracted the largest first-night crowd ever known there, 4,790. A total of fifty-six manufacturers were represented by exhibits. As in past years, the entire basement of the Auditorium was devoted to exhibits of trucks, commercial cars, bodies, and heavy parts and supplies.

The Milwaukee show is principally a retail selling proposition. It is estimated that more than 1,500 garage-keepers, repairshop owners and agents from every section of Wisconsin attend it.

## Cincinnati to Stop Reckless Driving

The city authorities and the judiciary of Cincinnati have both taken up the question of obedience to traffic rules and ordinances and the result is a more stringent observance of the laws which are now in force. Steps are also being taken to have enacted more rigorous laws for the control of traffic on the streets of the city.

Safety Director W. J. Friedlander, acting under instructions from Mayor Puchta, has issued orders to the police to place reckless drivers of automobiles and motor trucks under arrest and to force them to furnish bonds, instead of being cited to appear in court.

## Motor Truck Industry Prosperous

Prosperity may well be written in capital letters when it is used to describe the prevailing conditions in the American motor truck industry.

In comparison with the year 1914 the production of motor trucks was increased over 50 per cent last year, the value of its exports some 3,300 per cent, and the demand may be said to at least keep pace with the supply.

The tremendous increase in the export business, due directly and indirectly to the extensive employment of motor trucks in the great European war, leads many to the presumption that the present prosperous conditions in the industry are due in great measure to the war, and are likely to terminate with the declaration of peace.

Such is not the case. In the first place the so-called war business is limited to a comparatively small number of manufacturers. Secondly, the total exports of American motor trucks during the past twelve months represent less than 25 per cent of the year's total production, and much of this export business represents sales to others than the belligerent nations, and to countries not included in the European group. And thirdly, there are several indications that this export business will be largely maintained after the war is over.

It is the big increase in the domestic business of the American motor truck makers that is the real basis of the present prosperous conditions in the industry. In other words, this industry is sharing in the general prosperity now sweeping over the entire United States.

The manufacturer, the merchant, the businessman in general, whose sphere of activity includes the transporting of freight or merchandise, places the motor truck in the same category as he does any other efficiency producing and labor saving piece of machinery. When times are hard and conditions uncertain, such as has been the case in this country for two years or so preceding the past six or nine months, it is only natural that additions to equipment are held in abeyance.

During such a period of curtailment the need for additional equipment continues to increase, so that when the change comes a flood of buying commences.

It is just such a flood of domestic business, sweeping through the American motor truck industry in the past six months, that has brought about the prevailing prosperous conditions. The big export business has helped, and is helping, of course, but it is by no means the principal cause.

The extent, and particularly the increase, in the export business of the American motor truck industry is quite worthy of special mention. The official government figures for the fiscal year ending last June, in comparison with the preceding twelve months, show an increase in numbers of 1,500 per cent and in valuation of 3,300 per cent. This ratio of increase has been more than maintained in the past six months.

During the year ending June 30, 1914, exports of American motor trucks totaled 784, valued at $1,181,611. For the twelve months ending June 30, 1915, the official figures are 13,996 motor trucks, valued at $39,140,682. Contrary to general belief, this tremendous increase in the exports of American motor trucks is not due entirely to the purchases by or for the belligerent governments of Europe. Many shipments have been made to other countries in all parts of the world, and several hundred American motor trucks have been bought and placed in domestic service in England.

The European war has, therefore, benefited the American motor truck industry in two ways. It has brought large orders from the fighting nations for military purposes and has prevented the European manufacturers from exporting, thereby leaving the American industry an uncontested field throughout the world.

It is perhaps bold to assert that the future of the American motor truck industry is even brighter than the prosperous present. There are many indications, however, that such is the case.

With a new and more satisfactory federal aid bill before congress, and increased agitation for good roads, there is every hope that one of the principal handicaps to a wider use of motor trucks will be gradually removed. The employment of these modern freight and merchandising carriers is now largely limited to large cities where street and road conditions are favorable to their efficient operation. Their use in interurban transportation is confined to sections where improved highways are the rule and not the exception. This is a field wherein lies a big future for the motor truck, one which will develop as fast as highway improvement is carried forward.

---

## Two Persons to Car Average

The widespread popularity gained by the Milburn light electric has aroused considerable interest in the events that led up to the manufacture of this light but powerful car, which recently has demonstrated its ability over all kinds of roads, from country pikes to snow a foot deep.

The Milburn electric was the result of an exhaustive investigation by officials of the Milburn Wagon Company, of Toledo, Ohio, a company which has manufactured high-class vehicles since 1848. For years this company has been building bodies for some of the highest priced electrics manufactured, and its experience led it to believe that the public would welcome a light electric. How well it forecast is told in a recent letter to the Pierson Motor Company, in which it was stated that the Milburn factory now is working from fourteen to sixteen hours a day, seven days a week, in an effort to meet orders pouring in from dealers in every state.

Even after these officials of the Milburn Company were convinced of the need of a light electric they did not begin at once to build it. Instead they set on foot a plan to determine just what the requirements of such a car should be.

By actual count in Toledo, Ohio, where the investigation was made, it was found that only 4 per cent of the time did more than two persons ride in the heavy electrics. By this they reasoned that 96 per cent of the time the owner of a heavy electric was carrying almost a ton of surplus weight and using up a proportionate amount of current unnecessarily. They then began to plan a light electric; one which would be roomy enough to seat four persons comfortably, weigh about a ton less than the old-style electrics, and cost about half as much for operation and upkeep. Out of this effort was originated the Milburn light electric.

# The National Automobile Trade Association

*New Body Includes Dealers, Garagemen, Repairmen, and Supply Dealers*

A NATIONAL organization of dealers, garagemen, repairmen and supply store operators was formed in Chicago, January 27. The name National Automobile Trade Association was adopted. It succeeds the Associated Garages of America, which was formed one year ago, but has not made satisfactory progress in many respects.

Under a new plan put into effect the reorganization is to be carried on by Robert A. Wilson, secretary, and it is expected that the membership will be increased to 40,000 or 50,000 in a year and that it will attain national proportions within a brief period.

The officers elected for the ensuing year were:

President, Robert Bland, Evanston, Ill., Robert Bland Electric Garage.

Secretary, Robert A. Wilson, Chicago, 208 South La Salle street.

Treasurer, F. A. Bean, Detroit, 518 Garage.

Directors, Jacob Friedman, Dyersville, Ia., president Iowa Retail Automobile Dealers' Association; Walter B. Taylor, Rockford, Ill., retiring president of the national association; L. C. Steers, Detroit, secretary Garage Owners' Association of Michigan; Karl R. Vaught, Indianapolis, president Indianapolis Garage Owners' Association; E. T. Jones, Akron, secretary Akron Automobile Dealers' Association.

It is planned to build the association so that it may co-operate with the city dealers' associations in Minneapolis, Chicago, New York, Boston, Philadelphia, St. Louis, Kansas City and other cities.

Secretary Wilson will operate under the control of the board of directors and will put about 20 representatives into the field at once and begin the organization of the country by states. After a state is organized it will be left as a state organization to conduct its own affairs except when the advice and co-operation of the parent organization are desired and requested.

An immediate and extensive financing campaign is planned, as during the first few years the expenses will be greater than the income. In connection with the work the secretary plans an inter-insurance work whereby the rates of insurance on garages and contents will be obtained at cost. At present they are very high.

The next annual meeting of the National Automobile Trade Association will be held at the Hotel Gibson in Cincinnati in March, 1917. However, as the work progresses in various states, it will be necessary to hold many meetings, and the coming year should see many enthusiastic trade conventions.

Affiliated with the organization at present are:

| | |
|---|---|
| Iowa Retail Dealers Association | 800 |
| Garage Owners Association of Illinois | 300 |
| Garage Owners Association of Michigan | 150 |
| Garage Owners Association of Ohio | 100 |
| San Francisco Garage Owners Protective Association | 70 |
| | 1,420 |

Throughout the country are many local and territorial organizations which may become interested in the new national body: The North Dakota and Western Minnesota Automobile Dealers' Association; The Automobile Trades Association of Colorado; several organizations in New England; dealer and garage organizations in Birmingham, Ala., Fresno, Los Angeles, Oakland, San Benito and San Francisco, Cal., Denver, Colo., Hartford and New Haven, Conn., Wilmington, Del., Atlanta and Savannah, Ga., Topeka and Wichita, Kan., Louisville, Ky., New Orleans, La., Bangor and Portland, Me., Baltimore, Md., Boston and Worcester, Mass., Minneapolis and St. Paul, Minn., Kansas City and St. Louis, Mo., Billings, Mont., Exeter and Portsmouth, N. H., Asbury Park, N. J., Albany, Birmingham, Brooklyn, Buffalo, Geneva, New York, Rochester, Syracuse, Troy, Utica and Watertown, N. Y., Fargo, N. D., Erie, Greensburg, Harrisburg, Lancaster, Philadelphia, Pittsburg and Scranton, Pa., Austin, Dallas and Fort Worth, Tex., Chatanooga, Tenn., Norfolk, Va., Seattle and Spokane, Wash., La Crosse, Madison, Milwaukee and Oshkosh, Wis.; in New York state an association allied with the Automobile Dealers' Association of New York City, and a garage association.

During the meeting the garagemen defined a dealer in supplies and accessories as one who buys in bulk or quantity for resale to the consumer in accordance with established trade methods and who maintains a sufficient general stock to meet the requirements of his trade. A dealer in automobiles was defined as one who has a con-



*First Annual Banquet of the National Automobile Trade Association, Chicago, January 27, 1916.*

tract with a manufacturer or distributor, who lives up to the terms of that contract, has facilities for taking care of his trade, and operates in accordance with established trade methods.

The association endorsed the Stevens' price maintenance bill and decided to give it support.

E. T. Jones, Akron, Ohio, addressed the assembled garagemen as follows:

Organization is not a question of meeting once a year, making speeches, attending a banquet and thinking you are done. You must keep it in mind all the time. The secretary cannot do it all. We have good, medium and bad men in this business. What we need is men who will think, for there is a lot of cleaning up to do and we have a big three years' work ahead of us. We have got to help the other fellow.

Not all of us are up to the standard, but we can come up to the standard and can do it through our organizations. In Akron there are twenty of us in the same town. Seven years ago I worked for Andy Auble. Today we are competitive dealers, but the feeling between us now is the same as it was then, and we are getting the other dealers of Akron closer together than they ever were before.

Some one has said that when we ask a man to join our organization we have nothing to sell. This is not true. We have everything to sell and a man is not doing us a favor when he comes into our organization.

In Akron our co-operation has enahled us to combat the shopping car buyer, who goes from dealer to dealer with his story of how much he can get for his old car and is able to beat the price down unless there is co-operation among the dealers. If you believe there is no benefit in organization I suggest that you take a look at the organization of the Standard Oil Company, and consider the results it is able to accomplish.

Andrew Auble, Jr., Akron, Ohio, urged dealers and garagemen to clean up their places of business, get together in organizations, exchange ideas and work for the elimination of abuses and undesirable trade conditions. He said:

Customers are not the enemies of the garagemen, but are his source of income. You can't take money from a man unless you are there to perform a service for him, but we should receive fair pay for the service that we render. If you go to a professional man for advice you pay for it, and if he serves you to the extent of $49.80, he bills you for $50. We have a right to demand pay for service and should do so. A doctor objected to a certain charge I made on a job which he said did not turn out to be satisfactory. I told him I would gladly forget about the bill if he would send back all he ever got from widows for doctoring their husbands.

There is no stench connected with the word garage unless we allow it to accumulate, but we must have Better Business methods and better places of business. The merchandising cost runs from 19 to 26 per cent, and if we don't get more than 20 per cent maximum on goods, how can we make money and at the same time give service?

Service is only giving a man what he wants when he wants it and charging him enough for it. Free service has been the undoing of many a man. One of my dreams is that some day the word garage shall mean something, and I believe it can be if we but combine in our efforts.

It was suggested that manufacturers be asked to advertise their cars not at list price, but at list plus freight. R. E. Beedee, Davenport, Ia., said this would be impossible in national advertising.

J. C. Thorpe, Urbana, Ill., said it was up to the dealer to advertise in this way and insist that the customer pay the freight; this was his practice and he advertised his cars at two prices, one f. o. b. factory and the other f. o. b. salesroom.

Mr. Beedee said the practice in his town was to advertise the price, plus freight, plus $10 for handling, which charge had been established through cost systems. If a man objected to paying the freight, he told the customer that if he wanted to go to the factory and get the car he could have it at list, but that if he wanted it delivered to him in Davenport he would have to pay the freight and cost of handling.

## President Bland's Message

To the Garage Owner, Dealer and Accessory Jobber.

To amalgamate the somewhat divergent yet never really conflicting interests of garage owner, local auto dealer and *bona fide* auto accessory man, there was formed recently in Chicago the National Automobile Trade Association.

This is not a movement of preparedness to fight any real or fancied common foe—it is not pledged to wage any war save that of self-helpfulness, the elimination of economic waste.

The public need have no uneasiness lest this association be the forerunner of an offensive and defensive campaign for higher prices. By means of a co-ordination of effort every member should be able to increase his business and his profits and as a consequence to render to the public more efficient service for the present rates of charge or the same service at reduced rates.

Who is more interested in seeing that an automobile is properly garaged and repaired at a fair cost than the local dealer? Who is more interested in encouraging sales of automobiles, locally, than the garage owner? The tendency of the public to purchase and operate automobiles is in direct proportion to the fairness of the treatment afforded by local dealer and garagemen.

Despite the fact that, outside the larger cities where direct factory branches and exclusive sales rooms predominate, the garage man is, or should be, the dealer—and the dealer should operate his own garage (service station). The two branches have proceeded along separate, though parallel lines. Each branch of the industry has organized separately but it remained for the present movement to supply the standard around which all can rally.

The medium employed for this purpose was the Associated Garages of America, which numbered among its members garage owners and dealers in a dozen states. By an enlargement of its objects and scope provision has been made for the admission of any state or local association, composed of garage owners and retail automobile and accessory dealers.

One of the chief aims of the officials of the National Automobile Trade Association is to develop the *bona fide* accessory dealer. If the owner of automobiles can be convinced that automobile sundries offered as "leaders" by hardware dealers and department stores do not constitute legitimate merchandising and further that the "bargains" in autosupplies are often inferior and sometimes injurious to the machines, a service of incalculable value will be rendered to all concerned.

This association assumes the position that until garages and local dealers can command this patronage, which is legitimately theirs, they will not be justified in carrying complete lines, and with increased sales and correspondingly increased purchasing power they will be able to effect a saving worth while to the ultimate consumer.

By means of association endeavor we hope to establish the garage business in the confidence of the public which it deserves as an institution entrusted with the safe keeping of millions upon millions of dollars' worth of property. By this means we hope to establish in every community a retail market where dependable cars can be bought with an assurance of dependable service, and also we confidently hope to assure to the tourist who happens to come to grief in any town or hamlet on any highway such standard accessories or supplies as he may require to complete his journey.

The sign of our association, which will be displayed on the front of each members' garage, will soon come to mean an invitation to trade with an assurance of *protection* and a "square deal."

As president of this association, I feel the limitations which are imposed on personal endeavor. I realize the enormity of the task imposed upon me and my fellow officers and hence I call upon all who share our view to join in the work. Applications for general membership will be welcomed from individual dealers and garage men. Affiliated memberships of existing associations—either state or local—are solicited, and the association will be glad to assist in the formation of associations in new territory.

The general offices of the association, in charge of R. A. Wilson, secretary, have been located in the Continental and Commercial Bank building (Room No. 1938), Chicago, Ill. Inquiries may also be addressed to J. Freedman, Dyersville, Iowa; W. B. Taylor, Rockford, Ill.; L. C. Steers, Detroit, Mich.; K. R. Vaught, Indianapolis, Ind.; E. T. Jones, Akron, Ohio, directors, or to the president.

Editors: EO. J. MOCK, PAUL H. WOODRUFF
Circulation Manager: N. S. STRONGE
CHARLES R. CONDON: New York Representative
New York Office, 1022 Longacre Building
Forty-second St. and Broadway
Telephone Bryant 7030

*This publication is free and independent of all business or house connections or control. No manufacturer or supply dealer, or their stockholders or representatives, have any financial interest in Electric Vehicles or any voice in its management or policy.*

Entered at Chicago Post Office as Second Class Mail Matter

# ELECTRIC VEHICLES

PUBLISHED MONTHLY BY
ELECTRICITY MAGAZINE CORPORATION
Monadnock Building, Chicago
TELEPHONE: HARRISON 3014.

New York Office, 1022 Longacre Building, 42nd Street and Broadway.

Ed. J. Mock and Paul H. Woodruff, Editors

NOTICE TO ADVERTISERS
Changes of advertising copy should reach the office of publication not less than ten days in advance of date of issue. Regular date of issue, first day of each month. New advertisements will be accepted up to within five days of date of issue, but proof of such advertisements cannot be shown in advance of publication.

SUBSCRIPTION PRICE
Per Year $1.50

| | |
|---|---|
| Canada | $1.75 |
| Foreign | 2.00 |
| Single Copy | .15 |

FOR SALE AT ALL NEWS STANDS

NOTICE TO SUBSCRIBERS
REMITTANCES — Remittances should be made by check, New York draft or money order, in favor of ELECTRIC VEHICLES. Foreign subscriptions may be remitted direct by International Postal Money Order.
CHANGE OF ADDRESS—The old address should be given as well as the new, and notice should be received two weeks in advance of the desired change.

If Your News Dealer Will Not Supply You—Please Notify Us

Volume VIII CHICACO, FEBRUARY 1916 Number 2

## Too Many Promises

THERE is no element of bunk in the statement that the electric car thrives on far less attention and care than the gas car demands. Nevertheless, there is such a thing as too much pie; and over-enthusiastic assurances to the public that the electric takes care of itself lead to trouble. People are quite credulous about everything electrical. If we told them the car automatically pumped its own tires and vacuum-cleaned its upholstery they would doubtless believe it. The fact is an electric car can stand a certain amount of neglect and does not need a lot of the things that the gas car owner must learn; but it does need care and attention, and the sooner people are impressed with that fact the less disillusionment they will face.

When you have promised a man a lot of things and can deliver only half of them, it does not satisfy him to point out that he is still getting more than he could get somewhere else. The electric actually delivers to its owner more service, more satisfaction and more freedom from trouble than any gas car would even promise him. But on top of that sufficiency of performance, he expects more, for the very good reason that he has been told to expect more. He is disappointed, not with the actual behavior of the car, but with the non-materialization of the electrical miracle he had been promised.

With all the perfectly true advantages the electric car has, it is the height of foolishness to add to a sales talk purely imaginary advantages that not only deceive the buyer but harm the car and so make at least one new enemy. To say that a storage battery needs no attention except to charge it when needed is wilful misinformation. To promise long tours on a single charge is dangerous. To estimate ridiculously low upkeep and maintenance charges is wrong. To ignore the electric garage situation is deceptive. Yet these things, and others, are being practiced by electric car salesmen constantly, and no doubt help to make sales. They do not, however, bring any repeat orders; and they generally kill other sales to friends of the disappointed purchaser. There is no man or woman so unpopular they cannot influence the investments of others.

If a salesman cannot take orders for electrics by telling the absolute truth about them he had better turn to selling hash in a restaurant. The truth cannot hurt the electric—and false promises can. The car is good enough to win out over any gas car without any deception whatever.

## The Garage Problem

FOR several very good technical reasons we have been unable to get the garage department in shape as a department for this issue. As always, there is considerable material of interest to garage owners in these pages; but it is not segregated into a department.

The garage problem is, we believe, one of the most immediate of all electric vehicle problems. It is quite obvious that there is something wrong with the situation. Garage owners who are really ambitious to build up a stable business (no pun is intended) complain that

other garage owners seem not to care whether they make money or not. Some of them, indeed, apparently are doing their best to lose money, especially if they can make their competitors lose too.

That is a very foolish and childish way of doing business; yet it is a human trait that is in the catalog with a number. Invariably it is just a case of letting the primal passion of warfare run away with the business sense. The garage owner wants his competitors' business. If he has a real or fancied grievance against his competition, so much the better. The only way he can think of to get the business is lower prices. He makes the cut in his rates, gets the business, and proceeds to lose money—though he may not discover that fact at once. But when he does discover it he still smiles; for his competitors are suffering.

This charming condition is natural enough, in the light of what we know of human nature. But we wish to point out that men of big business do not operate that way. They have too much respect for profit and loss, and their so-called human nature is under better control.

There is a lot of inner satisfaction in getting your competitor's goat. But it doesn't compare with the satisfaction of knowing that business is good, that profits are reasonable and the bank account is growing. If the laborer is worthy of his hire, then service is worthy of its rate.

The service the garage man gives his customers he does not make out of his head. He buys it in wages and rent and raw materials and taxes. If he sells it again for less than it costs him he would be better off at home feeding the chickens. The man in business who deliberately loses money when it is within his power to make a profit is in the boob class—and no apologies. Any fool can run a business that way.

Big men get together and force their differences to pay dividends. Some men, of course, never can get together. A visitor to the state insane hospital once suggested to the superintendent that the involuntary guests of the institution might some day combine and walk away. "Huh!" observed the superintendent. "Nuts can't get together!"

But sane men can. They can form an alliance on the lines suggested by S. Olvent in this issue, and make a real business. It is so easy that neglect of the opportunity is difficult to understand.

## Stick to the Business

ELECTRIC car builders made visible progress at the auto shows this season. The inspection of their exhibits by the visiting public was less casual and more serious; and the number who stopped to ask questions was greater. There was less tendency to look at the electric as a departure from type, or a sort of interesting theory. In a word, the people showed greater understanding.

We said last month that the day would come when all the self-propelled vehicles on the street were electrically driven. The most optimistic of us cannot hope for that consummation soon, of course; if it comes about in twenty years it will be very sudden. Probably not all of the present coterie of manufacturers will be here to greet it, for some of them are already turning to other devices that promise more immediate money.

It would be a mistake, we believe, for any one to desert the electric car field now. Its market is rising, slowly but positively. There are a dozen indications, more visible to the observant bystander than to the manufacturer, that business will keep growing better. We mean that in a broad sense; not merely that more cars will sell this year than last, but that salesmen will be more welcome and prospects more interested and their understanding more practical.

At least two passenger car makers of excellent reputation and substantial history are now practically out of the direct field. They are still buying storage batteries and motors for their cars; they are still competing with the makers of straight electrics. But as apostles of the pure battery car they are no longer with us. That narrows considerably an already small field, and it is not unreasonable to assume that new interests will presently be attracted in to fill the vacancies. Either that, or some of the comparatively small manufacturers who now sell mostly in a local circle will find opportunity to expand to national dimensions.

We cannot see anything dark in the outlook for electrics. A product without fault, well advertised, cannot fail except as the patience of its sponsors fails. Those who stick to the business will be enormously rewarded when the climacteric comes.

# Keeping Step with the Times

*An Address on the Principles of Organization Efficiency*

BY H. N. TOLLES

WE are talking now in military terms. The air is surcharged with militarism. At our breakfast table at home every morning we fight over again the battles that are being fought on the other side of the pond.

I cannot help but think, though, terrible as this conflict is, that every seeming disadvantage in life has some advantage. The disadvantage is apparent. The advantage we cannot easily see.

I believe that every great conflict has its message.

To illustrate: The Revolutionary War taught one great lesson, and that was the lesson of independencc. It taught men to stand up on their backbone and declare their rights. You men are standing for certain basic principles which you believe to be true, and therefore you are exerting your independence in this day and age.

The Civil War taught the lesson of union. In union there is strength, and so in your organized industry you are uniting yourselves and preparing to show what strength there can come from united, concerted action.

In this present war it seems to me that the Kaiser is teaching the great lesson of preparedness, and no man today can enter the arena of business and feel that he is equipped unless he is prepared.

So this message, coming to us as it does, brings, as I see it, the thought of what real preparedness means, and in keeping step with these times what must we do?

I remember in the very meager military training that I had I was told that one of the officers in the Civil War, in order to get the old hayseed farmers to keep step, had to tie hay on one foot and straw on the other, and they would give the orders, "Hay foot! Straw foot! Hay foot! Straw foot! Now you've got it! Keep it! Left! Left! Left! Left!"

We are not so crude as that in this day and age, but there are certain things that mark our steps. The man or the organization that does not go ahead in this day and age goes behind. We must keep step. So it would appear to me that this spirit of co-operation is one of the indicative signs of keeping step with the times. We must have co-operation between organizations.

Co-operation, second, should come between firms. On the West Side in Chicago last summer a fire broke out in a laundry. The proprietor of the laundry was down in the loop some place and could not be found. By the time he got home, about ten or ten-thirty at night, he found his entire business gone and the walls gutted. Two doors away, in a little floral shop, were four of his competitors and a man from the North Side in the same line of business and a man from the South Side. And as he came into the meeting they said, "You needn't feel so bad about it, because we have arranged to continue your business for you." And the next largest laundryman said, "I am going to close my laundry an hour earlier at night and you can put your own employes in there and go ahead without the loss of a customer or without the loss of a day."

Instead of those men thinking, "Here is our opportunity to pounce on the neck of this business and crush it out," they said, "Here is our opportunity to show the spirit of co-operative competition and help this brother continue his business."

There is really nothing remarkable about that, because you men are doing the same thing in your towns. You can tell many similar stories, no doubt. I believe that truly. But the spirit of the age is to help and to boost.

The next thought that comes to me is co-operation between employer and employe. I believe we are getting rapidly to a system of profit sharing. I believe that the wise men of the age are going to do it on their own initiative, and I believe the trailers are going to do it because they are forced to, legally or otherwise. I believe today that no man can stand and say that he is independent, absolutely; that no man can say he is independent, but every last one of us in business are interdependent. Capital cannot get along without labor and labor cannot get along without so-called capital, and so we see again this spirit of this present age of co-operation.

I like to illustrate this by the hand. Here is the hand that represents the family. Here is the father, here the mother, and here the three children. In business, here is the big boss, here is the secondary boss, the head of some department, and here are the employes. I was not down there when the belt was taken from the black man and turned over to the white man, but I would be willing to wager any man present that that fight was not fought with the open fist. No, sir. They closed that fist as tight as they could and they put every power back of it which they possessed, and back of that they used all the brain power capacity that they could use to direct that blow.

How many times in business one department stands here, out here from the rest, and says, "Look at me, I am it. If it were not for me this business could not exist. I tell you right now I am the life of this institution." Then another department comes along and says, "If it were not for me you could not exist," and the treasury department says, "We have got to collect and conserve and develop and get capital into this business, and so if it were not for us you could not exist." And so it goes on down the line and every man says, "I am it!" Each fellow standing out that way is a separate unit and you only get a hand, really, by closing like this, shoulder to shoulder, and in that way we have the hand, but your fingers are just as they were before; and it is then through converging, concentering, co-operating, that the fist closes, the hand closes, and you have the fist.

Notice how those fingers are bound together in the natural way of the thumb. You can clench that fist as hard as you want to, but you cannot make those fingers feel the oppression of that thumb. I have seen organizations that closed down like this, with the thumb inside. They say the employes are riding on the neck of the old men. Now, the tighter you clench that fist the more that thumb feels the compression of those fingers.

What is the natural, orderly way of getting the co-operation, the unit system, in business? One of the best illustrations that I have ever seen of an effective organization is the tree. Personally, I love trees more in the winter time than I do in summer. I think they are a greater ornament.

Notice how the tree develops. You have the trunk. I am not going to say anything about what is below the ground, but you have the trunk, then you have the limbs and then the twigs and then the leaves. Did you ever stop to think that no limb interferes with any other limb, and they all get their sap through the executive organization, by which they get their life? It seems to me that is the way that authority naturally should be delegated, and you are going to find it an expensive proposition every time that you find the head of the institution going down and giving orders to the men digging in the ditch, and you are going to get into trouble. There is the natural, orderly way to delegate authority.

Now, in business, in the individual firm, which would you rather have, a team of stars or a star team?

I heard not long ago the honorable mayor of Chicago say before the Chicago Association of Commerce how when he used to be trainer over at the Chicago Athletic Club they asked him one day if he would take charge of a baseball team. In every conflict they had been defeated and humbled. He said, "I will take charge of you fellows if you will forget yourselves and play the game," and the boys pledged him. He said, "I got those fellows thinking about the game, co-operating. They went into the conflict forgetting about themselves and thinking about the success of the team, and they won." He said, "Over here in the City Hall that is what I am after," and he thinks that "Big Bill Thompson" is going to win in the management of the city government on that principle. So it is team work in life that we are after.

Now there are some things as executives that I think we should know if we are going to keep abreast of the times and work out this principle of preparedness.

As I see it, an executive is a teacher, and every time that you write a letter, you issue an order, you change an instruction, you are teaching your employes. Every time that you come in on time you teach punctuality. Every time

you come in fifteen or twenty minutes late beyond the time appointed, if you have any stated time to come, you are teaching tardiness. We teach really more by example than we do by precept.

If we are going to be teachers, what are we going to teach? Well, in the first place, the success of any organization is simply the success of all the individuals in the organization. If every one in your institution, from porter to president, makes good in a big way, then your institution makes good just that much; but if there is a single failure anywhere, just that much is subtracted from the success of every other one in the institution.

There we get the principle again.

The first principle of efficiency I will state is that the value of anyone in your institution is determined by just one thing, and that is the degree of supervision that that fellow requires in his work. The more looking after, checking up and following up that any employe needs, the less valuable he is.

It can be stated in this form:

$$V=I-S.$$

I remember giving an address to the employes of a certain institution here in this city, and I put on a card just that. I said that that was going to be the subject of the first talk, and I asked the employes when I got there if they could tell me what this stood for. One fellow stuck up his hand and said, "I think I can. I think it stands for 'Vacation in the spring.'"

$V$ stands for value, $I$ stands for the individual and $S$ stands for supervision.

Suppose you have your maximum value 100. Suppose a man's supervision is 75, then his value is 25, isn't it?

If his supervision is 25, then his value is 75. As the supervision increases the value decreases.

To illustrate, suppose you have a department, the head of which receives $50. I do not care whether it is a week, a month, or a year. You have ten people in the department. One-half of that man's time is spent in directing, one-half of it in supervising. Direction is always necessary because you must always tell the fellow what you want done and possibly why you want it done; but supervision is following the thing up and seeing that it is done at the right time, in the right way, by the right man. $25 is chargeable to direction, then, and $25 is chargeable to supervision.

Here is the question: Who pays this twenty-five? The company? No, sir. The manager? No. I maintain that each one of these ten men pays two and a half dollars out of his pay envelope to support this fellow.

We talk a lot about the conservation of the natural resources of this country. I have stood, as of course you have, at that great Niagara, and have seen that great onrush of water; and then you go out to the side and you see where there is a little bit of a hole made and a small stream of water is taken out, and by the use of the turbine we have our power and heat and other things developed. We say that this is a loss. It is true, but there is no appreciable effect upon the volume of the stream by all of the water being taken out, and it seems to me that the same proportion probably exists in human efficiency today. We are efficient in some avenues, but the great loss in the business world today is human loss.

Speaking down in Indiana some time ago before the employes of an overall factory, I told those girls, "All that this firm can do for you is to furnish you a sewing machine, a table and a chair, a place on this floor where you can go into business with yourself, and everyone is in business for himself and each one is either adding to the profit or subtracting from the profit of the business." And I made the point that "Every time you walk across this floor twice when once would do you take that much profit out of your own capacity and out of the earnings of this company. Every time you unnecessarily break a needle you subtract profit." And it is true, I think.

So I get this point: That the greatest waste there is in all this world today is human waste, and the greatest conservation movement there is in America today is the conservation of human energy, and we have got to come to it sooner or later.

Why is supervision necessary? Because, gentlemen, in our work two things occur: Errors of omission and errors of commission. You subtract the mistakes that a man makes in his work and you again determine his value. The mistakes are of two characters, either things omitted that should or could be done, or things committed that never should have been done.

Speaking before the employes down in the Jefferson Hotel in Peoria, the colored waiters, in fact, I made the point before those fellows that they were making two classes of errors, errors of omission and errors of commission; and I had some of them name some of the errors that were made in the dining room and would have some one else say what kind of an error that was. That afternoon, after we had a very interesting drill, the proprietor was going through the servants' quarters, and he heard this conversation. There was just a board partion there, so he could hear what they were saying. And one fellow said to the other, "Go on, you wuthless niggah! You'se nothin' but a omission niggah, no-how." So apparently they got the idea.

Now, then, the next thing is this. There is a great dual force that operates all through life. We call this the dualistic philosophy as against the monistic philosophy. Everything is in pairs. Light has its darkness. Heat has its cold. Fertility has its sterility.

I will say, for the sake of giving convenient terms,—not from an electrical standpoint—we have the positives and the negatives.

In the body we have health as against sickness, we have strength as against weakness.

In the mind, the mind is divided into three particular channels or divisions: where we know, where we feel, and where we will.

Up in this part of the brain, we are told, we have such qualities as observation, concentration, memory, reason and imagination. We are told that there are three tenses to the intellect: The present, to think, the past, to remember, the future tense, to imagine.

I think that in keeping step with the times and spirit of this present age one must look ahead, and practically all that you men do is done in your imagination. All salesmanship is directed to the imagination of the other fellow; and yet only a few years ago we used to hear men say, "Well, I don't want any man of imagination in my business, I want the fellow that is down to earth."

In thinking, the present tense, you know, there are a few people who think. There are others who only think that they think. Be honest. Do you think, or do you think you think?

Memory is one factor of the intellect. Its opposite is forgetfulness. Judgment has injudiciousness.

Under the feelings, located, so we are told, in the back lobes of the brain, we have such qualities as faith, with doubt; courage, with its fear; loyalty, with disloyalty; honesty, with dishonesty—all matters of feeling.

But had I the time I would prove to you that every deal that you have ever made or put through is two-thirds feeling, and yet we do business, we say, on the cold-blooded business basis, meaning the intellectual side.

Under the will power position, punctuality has its tardiness. All told there are some sixty positive and sixty negative qualities. Every error, either of omission or commission, is directly traceable to a negative condition in the man who made the mistake.

The greatest waste is human waste, and one of the greatest evidences of it is this hire and fire, and fire and hire business. Anybody can fire a man if he has got enough authority to do it. It doesn't take any intelligence to fire a man, but it does take intelligence to take that man who has failed and made mistake after mistake, get him into the private office, and there, not before other people—bawling him out, which makes him feel bad—but in the quietness of the office, or off on the street corner some place,—and say, "Here, Bill, you know that mistake you made was due to forgetfulness. You have made a lot of mistakes through forgetfulness. Do you know you can cut that out? Do you know that forgetfulness subtracts from your efficiency, that it makes supervision necessary and that it reduces your value? All right. If you do, cut it out. I am going to tell you how. You eliminate forgetfulness by developing memory, just the same as you eliminate darkness by turning on light, and it is important that you should do that very thing." Then you go to work and show him how to overcome these defects.

Andrew Carnegie used to say even in the steel mills it cost him $35 every time he broke in a new man for the job. Think of the waste in business there is in breaking in a man, where it is possible a little fifteen minute talk with that fel-

low would put him on his feet and he would go along all right.

By the development of the positives of the body you get physical endurance. Follow that and get into the game and be a healthy animal. Do you know it has been recently developed that there is no sound thinking in a diseased body? If you are physically under par you are mentally under par. In fact, some men are commencing to believe that thinking begins in the body and not in the brain at all. You think of the time when you had that tormenting tooth-ache and try to realize how many poems to spring you could compose while that tooth was aching.

You cannot think right if you are not physically right, and so many men are digging their graves with their teeth. They are sitting on their livers and standing on their stomachs. Possibly some are here.

We are breathing dynamos and do not know it. You men that own your automobiles, I will wager that you know more about the engine in that car, and you spend more time in lubricating it and tightening up the nuts on that car than you do in keeping that little human engine in first-class running order.

Therefore, we need in business today a human, physical endurance, efficiency, and the wise manager is the one that looks to it to see that his employes are physically fit.

Then, under the intellectual, we have a composite quality of ability, which comes from the development of the positives, observation, concentration, memory, judgment, reason and imagination.

Take the first, just for a moment. All that you are today, gentlemen, is the total of all the things you have heard, seen, smelt, tasted and touched through your five physical senses, plus the use you have made of those things. That is all you are. Therefore the more ideas that can come to you through the five physical senses, through observation, the more material you have with which to intellectually build endurance and ability.

There are lots of people who think that is sufficient, but the penitentiaries are full of men that have endurance and ability. A man may be only a cultivated criminal if he has simply endurance and ability.

We need, therefore, the development of the feeling, from which we get the composite quality of reliability. The greatest ability in all this world, men, is reliability, and what this world wants today more than any other one thing is that fellow, that employe, that will stand where he is hitched, so to speak. The fellow that will perform in your absence as though you are present, the fellow that will say to your back exactly the same thing as he would say to your face, that is what you are after.

I wish I had time to talk about these two, doubt and fear. We know doubt and fear have killed more business successes than the armies of the world have ever killed men, including this terrible conflict which is operating on the other side of the water. We doubt ourselves. We doubt our business. We doubt our fellow employes or officers. We doubt the patrons. We doubt, doubt, doubt, doubt. We become suspicious, and then we wonder why we cannot make good. I tell you, faith is a commercial asset. It is not a religious matter at all. It is a matter of a quality in the brain, which applied to religion does become a religious matter, but it is just as much an inheritance of the business man in business as it is of the religious man in religion.

Now, we only have three-quarters of a man here until we develop the active side, or will, giving you the man of action. I will say that if Theodore Roosevelt had done no other one thing than to set the idea or standard—I care not what your politics are—but if he had set no other standard before mankind of this nation than simply to show what one man can do in a lifetime, he would not have lived his life in vain. Because we know Roosevelt as the man of action; we know Abraham Lincoln as the man of reliability, and I think we are going to realize or know Wilson as the man of ability. I have often said, and I believe it to be true, that you and I as business men of this great nation today are extremely fortunate in that we have in these war times a man who is fighting his battles mentally instead of with bullets.

You add these four words together, using the plus sign, and counting the letters you will find there are thirty-six of them, and that is the mental yard stick of efficiency. If you want to know whether an employe is going to perform well or not, ask four questions. How is he on ability? How is he on reliability? How is he on endurance? How is he on action? And if he is all right and has the capacity of intellectuality, if he has the quality of reliability sufficient for the job, if he has endurance physically and he has the will power of action, he is going to be all right and he is going to succeed as an employe.

Here we have the four square again: The man of ability. reliability, endurance, action. A-r-e-a spells area. The mental area in a man is simply a question of how far he has expanded these qualities; that is all.

There are men who build the area large, others who build it small, and then the wee, wee, fellows. This little chap may be the man who digs ditches. This man may be the president of the United States. How do they differ? Only in a degree of development; that is all.

Every man, if he is normal at all, has the same number of bones in his body that any other fellow has. He has the same muscle formation on the bone. He has the same brain qualities as any other man has. Then how do we differ? We only differ physically in degree of development of the physical part, and we only differ mentally in the degree of the development of the mental part of us; that is all.

Here comes along an opportunity. That opportunity is only an opportunity for the man that has an area larger than the opportunity; that's all.

Therefore it behooves you and me to take what we have—and we have all the raw material within ourselves to make a greater success—and expand that and keep on expanding it, and we can do it.

I am not talking to you as "has-beens" or "going-to-bes," but I am talking to you as "ises" today. I am talking to you men who are men of affairs, and I recognize you could probably buy me, and all I have ever known, out; but if I had the power to draw the picture of any man in this room on this blackboard, raised to his highest power, there is not a man in this room that would recognize his own picture. We put too small an estimate on ourselves.

Another principle: It is a dangerous thing to compare men. You or I may say, "Well, I know that fellow. There were ten men in my class in college, ten of them, and they are all of them dubs and I am making as much as any three of them today."

But that is not a fair comparison. You will send five men out on a job in sales work, we will say, in five sections of the city, and you compare those men. It is unfair. The real inventory, the real sounding—that is a better word—the real sounding as to depth should be, where was that fellow a year ago as compared with where he is now?

It is a law of physics that two bodies cannot occupy the same space at the same time, and it is also true that two humans cannot possibly occupy the same space at the same time, not for a single instant in life, and if not for a single instant, how are we going to make a comparison? Speaking of this inventory, you take possibly every year an inventory of all the assets of your business, but I think that the greatest asset any business has is its human asset, and I believe we are going to be wise enough one of these days in business to discover a method of determining the asset of the individuals in the business, and they are the really important features when you come right down to it.

There are men who build their area large. There are numbers who build them small. There are a lot of them who build them irregularly. In fact, we all do. There is no person perfectly developed.

There is no such thing as a perfect man. We are not perfect. Our hope does not lie in our perfection, but it does lie in our perfectability. We never will have that organization at the point where we can say it is perfect, but we can always approach a little more nearly that point.

Mathematically we could say that that man's area is only equal to the square of his smallest side. If that is true, what should he do?

First introspect as to what in ourselves and in that employe there is weak, and then get busy and expand that weakness into strength. How do you do it? You do it just exactly the same as you develop the physical muscle. You exercise the muscle and you feel it. You know just as well as I do that two plus two equals four. Nourishment plus use equals growth, just the same. You nourish the body on the right kind of food and exercise it properly and that muscle cannot help but grow. How? I don't know. If you will tell me how the ox eats more grass, the grass becomes more ox, I will tell you how it is done. But I know it is done, and you do.

It goes without saying, if you want to develop any one factor in mental quality, there are just two things you can do. First, to feed that particular quality on the particular kind of food that will develop it, and then exercise it and it is bound to expand.

Nourishment plus use equals growth.

And here this brings me to another point on the subject of handling men in business and that is that I maintain that every proprietor or manager of men has a right to know what kind of mental food his employes are thriving upon. I am going a step farther. Every employe that works for you does not work for eight or ten hours, but he is on your payroll for twenty-four hours of the day, and everything that he does with his body or his mind outside of business that robs him of his power to produce in the right way the next day, you have a right to look into. Not from the selfish standpoint, but from a standpoint of service to that man, because he is in business for himself.

Therefore, we, in order to get the greatest efficiency from our employes, must understand and know how to handle those men in business.

And so in business today I believe that every proprietor is a teacher, and every teacher can be taught, and that your function as an executive is not satisfied when you simply put the money into the pay envelopes up to the point where you promised to do it.

I had the honor of being employed at one time with Mr. Wanamaker in a confidential capacity, one that brought me into contact with him frequently. I was in his office one day when a man was making a report. When he went out Mr. Wanamaker said, "There is a man that has been in my employ for seventeen years, and if it was not that I had pity on his family I would have fired him long ago, and he feels hard at me because I have advanced men over him. But," he said, "you know, it seems that men are different today from what they were when I was a boy. My first position was at three dollars and a half a week in a grocery store, and one morning I remember in my first job I was standing out in front of the store and a competitor from two blocks down the street came to me, and he said, 'John, I like the way you work. I would like to have you work for me.' I said, 'I couldn't do it.' He said, 'How much do you make?' 'I get $3.50 a week.' He said, 'I will give you $4.50.' I said, 'No I can't do it.'" After a long discussion the man pressed Mr. Wanamaker for an answer and he made this reply: "I have not learned all that there is to learn here yet. When you come along and show me where I can learn more in your business than I can learn here, I will come to work for you for the same pay."

How many men in business today, how many young men in business today, are starting out with that ideal in mind? But is it not the true ideal?

In handling men in business, I believe that the spirit of the times teaches this: That what the man earns in money is only half the value of the job, or, in other words, what he learns ought to be equal to what he earns. I believe that you can hold men in business as employes if you can only get them to realize that they are expanding and growing. Instead of keeping the man down, give him an opportunity to have the broader and bigger vision of life.

Now, do not misunderstand me. I am not trying to tell you anything. I am not trying in the spirit for one single minute of a critic. Neither am I talking in the spirit of an educator. No educational system in this world ever educated a man, no man ever educated another man, in the real true sense. All that any educational system can do for any man is simply to provide a track for him to run on; and my hope is of taking these ideas which you have here and stirring them up and possibly organizing them and clarifying them in such a way that you can get more out of them.

Nourishment plus use equals growth. And you have a right to direct the reading, the mental culture, and to stimulate the growth of your employes from two standpoints; one of altruism, because you are greater and stronger than he, and the other dividends, because it pays.

I would have you go home and take with you these thoughts: First, that every employe that you have has within himself the raw material out of which to build a much greater success, and that the success of your organization is simply the total of all the successes of all the units in the organization: second that the success of a plant or system or a trade of this character is simply the unification in conventions of this kind, the standardization of ideas.

## Goodrich Factories Near Completion

The addition of three enormous buildings which are nearing completion will make the plant of the B. F. Goodrich Company, at Akron, Ohio, probably the largest rubber factory in the world. Before these new buildings were erected the Goodrich institution was already the world's largest plant devoted to the manufacture of rubber goods, but with the immensely increased capacity provided by the recent additions, which are in themselves larger than most of the more widely known rubber factories throughout the country, the Goodrich plant now ranks far ahead,—becomes a veritable plant of the industrial world.

An idea of the immensity of the Goodrich factory may be gained when it is said that the group of fifty-seven buildings composing the plant have a floor space of nearly a hundred acres and that one would have to travel 3.8 miles in going once around the grounds which the buildings occupy.

Unlike many of the industries of the day, the business of the B. F. Goodrich Company has none of the characteristics of mushroom growth. It has not sprung up over night, nor is it the result of abnormal conditions which have developed within a year or two. It has been built up gradually for many years, in accordance with the soundest principles. The solidity and permanence of the new buildings as well as the others composing the group that makes up the enormous plant is characteristic of the whole Goodrich institution.

Steady and natural growth of the company's business in the general lines of rubber products, coupled with the widespread demand for Goodrich Black Safety Tread and Silvertown Automobile Tires, "Hipress" and "Straight Line" rubber footwear, Goodrich Double-Duty Waterproof Clothing, Truck Tires, Mechanical Goods, etc., may be named among the factors which have made enlargement of the plant necessary.

The largest of the new buildings is a finished goods warehouse, 320 feet long and 280 feet wide, with one wing which is six stories high and another of seven stories. This structure is about completed.

The second largest of the three new buildings is six stories high, 300 feet long and 100 feet wide. It will be used for manufacturing and storage purposes. The third is a building that will be utilized as a machine and pattern shop. It is five stories high, 260 feet long and 100 feet wide.

All the new buildings exemplify the latest ideas in factory construction. Lattice steel columns and girders encased in reinforced concrete are used throughout for the frame-work. Each of the buildings has concrete floors, brick walls and steel window-frames and sash. The buildings are equipped with elevators and enclosed fire-escapes. The new structures will have the same adequate sprinkling system that contributes to the safety of all the buildings which constitute the great Goodrich plan.

With the occupancy of these three buildings, which will take place within a few weeks, the facilities of the B. F. Goodrich Company will so greatly overtop those of any other concern engaged in the rubber manufacturing business as to preclude comparison.

---

Hold the speed of your car steady around twenty miles per hour and you will get there more quickly, safely, pleasantly and at less expense.

# Problems We Face and Their Solution

*Address Before Electric Vehicle Association's Annual Convention*

BY GEORGE H. KELLEY



*George H. Kelley.*

THE past year has shown a very, very marked development in the electric vehicle business. The devolopment has been particularly marked in the co-operation which has arisen and developed between the various elements of the industry. The problems that we are facing really can all be resolved into two. One is the question of creating a demand. The other is the question of how to care for the cars after they are sold.

When it comes to the question of demand we know, those of us who are actively in the selling end of the business, that the great objections we have to meet in the electrical vehicle business are the questions of speed and mileage. Those are the two great things that come up and hit us in the eye in the minds of the general public all of the time: "You don't go fast enough." "You don't go far enough." People do not realize that the electric car of today—the pleasure car first—gives more mileage than any person cares to drive, except the absolute newcomer who has his very first car and who wants to go out and drive three hundred miles in a day. We all used to go bicycle riding and take a century run. How many of us ever took more than one century run? A motor car today is a car of utility, a car of pleasure, and not a car to do stunts with.

The electric car furnishes utility; it furnishes service; it furnishes comfort for the demands of every man, woman and child that need these uses or want a motor car for ninety-nine per cent of their uses. Ninety-nine may be a bit high, but I have had experience with person after person who have both electric cars and gas cars, who use them both. They use their electric cars most of the time; they use their gas cars once in a while, and finally when they come to take a quiet little inventory in their own mind of why they are keeping that gas car they have to sit down and figure awfully hard, and the closer they figure the quicker they realize that the way to use the gas car is to go to a livery company and rent it for a day when you want it, but in the meantime use your electric. A great many people are coming to see that in city use when it comes to speed, we have speed in electric cars that exceeds the speed limit permitted by law in any city in the United States. We can drive in our cars here in Cleveland, or in New York, or in Chicago, or any other city, faster than the law allows, and can start side by side with the gas car, and the gas cars will violate the law and the driver will get arrested three times going across town, and we in our electric cars will arrive at the same destination a minute later without any danger of arrest. We have done it with a comfort, with an ease, with a facility of operation that has never yet been seen in any gas car that I have ever ridden in. The people are beginning to realize that more and more, and we are showing the people how it can be done by increased demonstration and increased liberality on the part of the manufacturers providing their dealers with demonstrating cars; an increased number of users, and, as time goes along, the people are realizing more and more that the electric car is the town car, beyond all question.

We have to show them. They have to be shown. The other side of the problem is how we are to show them and how best to show them, and that is the tremendous problem. There is no pleasure in driving a gas car after you have driven an electric and know what it will do in your ordinary service, and that is the problem—the problem of education. It is the old problem.

In the truck business we know that an electric truck will do the great majority of the city work cheaper and more efficiently than any gas car that has ever been known. We know that the initial cost of that electric car is absolutely comparable with the initial cost of high grade gas cars. We can't compete, with our good workmanship, high priced material and expensive equipment, with the cheap gas car, but when it comes to a comparison between the electric commercial car of today with the high grade gas cars, the prices, the initial cost, it is comparable. The operating costs are so much lower that if we could persuade the people, if we could show them, if we could make them believe, if there were enough of us that were sufficiently acquainted with the facts to get by with it, the electric commercial car business would go forward with such strides that there are not enough manufacturers today in the country making commercial cars to supply them. I know that and every man who is in the electric car business and knows the operating cost of electric cars compared with gas cars knows it. You can't get away from it.

There is the field for the gas car. Don't crowd a complete electric equipment down a man's throat. Apply the electric cars where they are applicable. Apply the gas cars where they are applicable. They have their field, but the electric car field is three times as big as the gas car field in city work.

That is the thing we have got to show the people and we are showing it more and more every year. The attitude of the express companies, the attitude of the big department stores who are using both classes of equipment and who are buying today gas cars only where they have to buy them, and buying electric cars in every other place and where everyone of them who is using comparable fleets says the electric car is so much cheaper to operate that we want the electric cars.

The other big problem, aside from the proposition of the selling of the cars, the creating of the demand, is the care of an electric car.

We must admit between ourselves that an electric car is not able to get the care, the expert care, the educated care, generally speaking, that a gas car can secure today. You could go into any one of a hundred repair

shops where your gas car can be taken care of and mechanics know what to do with it. If you have an electric car you have to go, in order to get the proper care, to an educated electrical man, and I regret to say that there are few. In Cleveland there perhaps are a dozen garages where electric cars can be properly cared for. There are probably two hundred, or a hundred and fifty, repair shops and gas car garages where your gas car can be cared for. The electric user will take his electric car into the nearest repair shop, and it may be the gas car repair shop or a place where they pretend to know how to take care of an electric car. The car doesn't get the expert attention that it requires and the result is that it is not satisfactory in the user's hands, and that after all is the thing we are all aiming for. It is easy enough to sell cars. The difficulty is to keep them sold, to get the repeat orders, to make your car stay so well sold that the next time a man wants a car he comes to you and says he wants another electric car. That is the cream of the business and that is the business we are all looking for, and to do that we must make sure to have facilities for the care of the electric cars, so that they will be absolutely properly cared for. There is where the central stations can be of the greatest possible assistance to the electric manufacturers. We can't, in the nature of things, go into every city, each one of us, as manufacturers, build a garage, and operate a garage. There is not enough business for us all. What we want is a well-run, well-equipped electric garage where we can all send our cars and be sure that they will be properly cared for.

In the past year and a half there have been very large strides made in that respect. The action of the New York Edison Company in its big garage in New York, where it has relieved us of our garages and has taken into its own the cars we had all been taking care of and given them splendid service, and all the rest has been a great relief to us. Our salesmen have been able to go out and attempt to sell a car, and spend all of the time selling cars instead of standing idly by attempting to make excuses to customers.

The battery service proposition is going to have a tremendous effect in the business. I agree that the battery service proposition must be elaborated to take care of the batteries and cars of all manufacturers, but that in itself has been a tremendous help, and we have already noticed the impetus that the system has given to the business. It enables the manufacturer and the salesman to go and say to his customer, "Here is your car, and here is what it will cost you to run it," and the wise buyer today is not as much interested in the initial cost of the vehicle as he is in what it is going to cost to run, and the battery care and the battery service has been the great big problem in electrical vehicles, and the battery service propositions have helped materially.

In the educational end of the business, to get our ideas, our electrical ideas, before the public, the co-operation of the central stations in the advertising propoganda has been very, very marked. Their liberality, the freedom with which they have co-operated with manufacturers in the last few months, or the last year or two, is something that we have all welcomed. As I said, this action was something that I would not have believed possible to obtain six years ago. We manufacturers appreciate the co-operation which we have had and the continual growth of that co-operation.

Another feature which has developed in the past year is the electric taxicab—a splendid proposition. The electric taxicab as an advertisement for the electric vehicle is the greatest one thing that has been done in the history of the electric vehicle business. Thousands of people who have never had any idea whatever of what an electric vehicle was, how they would run, or anything else, are going to learn from the use of electric taxicabs what the electrical business is, and the electric taxicab business is here, and it is here to stay. I will venture to say that in five years from today the electric taxicabs will so far outnumber the gasoline taxicabs that we will have forgotten that there was anything so disagreeable, disgusting and rough on the nerves as the present gasoline taxicab that we find in every place in the country. As soon as the people, as they will, learn to realize, through the use of those taxicabs, the joys of an electric vehicle, our problems are going to be very much simplified.

The last few years before the conventions of these associations we have had a great deal of discussion about the high price of electric cars. The past year has shown some remarkable developments in that regard. One company is putting out a commercial car today at less than a thousand dollars. Another company has put upon the market a pleasure car, one of the best designed in appearance that we have ever had, at a very moderate price. Another company has very materially reduced the price of its standard product of last year. All of the companies have reduced the prices of their cars from ten to fifteen or twenty per cent during the past year.

I told you last year that when the demand came for a low priced electric car the manufacturers were ready to produce it, if the public was willing to accept what it pretended to ask for. We have gone farther than that, a lot farther than that. The manufacturers have gone so deep in the last year that they have frankly reduced their prices to the place where they are absolutely dependent upon the market to increase their sales in order that they can make a dollar. The sales must increase, and must increase very materially for the manufacturers to make a profit at their present prices. We have the demand. The demand was for a lower priced car. We cannot meet the price of the gas car. The fundamental elements in the construction of electric cars are not susceptible of anything like the reduction on account of quantity production which you can obtain in the gas car. We are dealing with a different class of materials, with articles whose price is much more fixed, but still we have done our best, and I want to thank the central station people for the co-operation they have given us and for the appreciation which they have shown of our efforts.

About the battery business—we have tried and we have tried hard; we are doing all as manufacturers we can; the central stations are doing all the central stations can do; the accessory people are doing all that they can, and, gentlemen, our great problem today, summing them all up, is to get a little closer together, get a little more friendly feeling, a little more *esprit de corps* towards the development of this electric business, all of us get a little more soul to it and go to it.

---

## Goodyear Opens Station in Dakotas

The Goodyear Tire & Rubber Co. has opened a service and sales station at Aberdeen, S. D., to cover northern South Dakota and southern North Dakota. H. F. Brownell Co., Sioux Falls, state agent, will manage the new station.

# Improvements in Electrics

*Future in Commercial Field as Traffic Vehicle is Unusually Bright*

BY A. JACKSON MARSHALL

THE past year has seen many changes and improvements in the electric vehicle industry, all of which point to an unusually bright future, both for the electric in the commercial field and as a passenger car. There have been no sudden, illusory spurts of popularity in the progress of the electric vehicle, rather it has been a gradual, steady growth, forming a good, strong foundation upon which to build up its ever-increasing business.

Ever since the transportation world has recognized the value of the motor truck in the larger cities where there are opportunities of testing the various forms of trucks, that while the gasoline motor truck is especially adapted for long uninterrupted hauls, the electric vehicle is the desirable and economical vehicle for city and suburban work.

The Boston Institute of Technology, employing the best authorities in an unbiased study of transportation problems, bears out this statement of the electric's adaptability to city traffic after four years of observation and statistical study. The American Express Company has been a consistent buyer of all forms of electric trucks for the past seven years. It has now about 300 electrics in use in two cities alone and the additions to its various fleets during the Fall and Winter of 1915-16 are practically all of the electric type.

The Adams Express Company operates 326 electrics in two large cities and has just received the final shipment of an increase in one fleet of 42 electrics. The Ward Baking Company is now using 610 electric delivery wagons. The Jacob Ruppert Brewing Company has 145 electrics, many of which are five-ton capacity units; the George Ehret Brewery, 136; the New York Edison Company, 130. A number of large fleets of electric coal trucks, varying from the light two-ton capacity to five and six-ton trucks, are used in and around Boston, where they are operated eighteen hours a day, hauling coal to the business houses and office buildings at night, thus avoiding the difficulty and delay of operating in the sections where traffic is more congested during the day. In the lighter class of delivery wagons the department stores have shown a strong preference for the electric.

While nearly all of the largest fleets of electric vehicles have been installed primarily through the efforts of the vehicle manufacturers, the electricity supply companies (central stations) of the country have exercised considerable influence in the promotion of the electric vehicle. However, there are comparatively few that appreciate the tremendous opportunities attending its further development. In New York City for example, there is a minimum of something over $10,000,000 annually to be derived from the sale of current for electric vehicles in place of horses.

Of 10,000,000 horses that are in use in the cities and towns of this country probably all could be successfully displaced by electric vehicles. This would mean an additional income to some 6,000 electricity supply companies of about $1,000,000. This is all the more significant when we consider that the combined income of all these central stations from all sources last year was approximately $450,000,000, of which but a small percentage was derived from the sale of current for electric vehicle charging. Even if only a small fraction of the business in sight were obtained, it would represent a tremendous increase in the total incomes to the electricity supply companies.

That the horse and wagon is gradually being displaced by the light electric delivery wagon has been demonstrated by the very successful campaign recently carried on by a well-known manufacturer of vehicles of that type. Within its capacity rating the small 750-pound electric delivery wagon costs less to operate than a single-horse wagon and can perform a far greater amount of work. Where conditions are such as to demand mileage ranges of 30, 40 or 50 miles a day, the saving obtained by the use of this car may actually cover its cost in less than two years, and this after all other running expenses have been paid for.

It costs less to keep this car in tires than it does to keep a single horse in shoes for the same work done.



*Walker Vehicle Company's 24-Passenger Electric Bus, Sold to Virginia Railway and Power Company, Richmond.*



*Walker Truck Equipped with Walker Self-Contained Electric Winch for Pulling Underground Cable; also Compartment Body for Supplies.*

For equal service the cost of current at five cents per kilowatt-hour amounts to but half the cost of hay and oats alone. In New York City more than fifty livery stables have expressed a willingness to store and wash this car for $10 a month. These same stables get from $27 to $30 a month for stabling and otherwise caring for a single horse and wagon, and there is profit in the former and almost inevitable loss in the latter.

Another important development of the electric vehicle during the past year in a special field is its adoption for municipal service by many of our most progressive cities in one form or another. It is with considerable interest that fire chiefs throughout the country are watching the results and performance of electrically propelled firetrucks and engines in the cities where they have been adopted. This should prove an especially fertile field for the exploitation of the electric, because of its inherent qualities of absolute dependability, its ease of operation, immediate response to driver's touch, and great simplicity of working parts, all of which are vastly important in operating fire apparatus.

Electric street sprinklers, snowplows, steamrollers, police patrol wagons, and ambulances are all being gradually adopted by progressive municipalities, which recognize the economy of operating cost and efficiency of the modern electric commercial vehicle.

## Owen Magnetic Car Absorbed by Bakers

A consolidation of the Owen Magnetic Company, New York city, manufacturer of the Owen Magnetic car, and the Baker R. & L. Company, Cleveland, O., has been effected. The new concern will be known as the Baker R. & L. Company, but the cars to be manufactured will be known as the Owen Magnetic, which will be built in two models. The Baker factory in Cleveland will be given over to the manufacture of Owen Magnetic cars. The R. & L. factory at Cleveland will be used for the manufacture of bodies for the Owen Magnetic, and in addition will continue the manufacture of electric cars, which the Baker R. & L. Company has been producing.

The capital of the Baker R. & L. Company will be increased from $2,000,000 to $5,000,000. R. M. Owen, who is president of the Owen Magnetic Company, in New York city, will be vice president and director of sales. The General Electric Company, which recently obtained a considerable interest in the Owen Magnetic or Entz patents, will have directors on the board of the R. & L. company because of its interests in the electric transmission used in the Owen Magnetic cars.

Anson W. Burchard, vice president of the General Electric Company; D. C. Durland and Richard W. Swartout have been elected to the board of directors of the new company, representing the General Electric interests.

The present Owen factory in New York city will be continued for development purposes, as well as serving as a service department. The assets of the Owen Magnetic Company, however, have all been acquired by the Baker R. & L. organization.

It has been known for some months that the Baker R. & L. Company was producing a gasoline-electric car built under the Entz patents, which are the basic ones in the Owen Magnetic design. This car is a smaller one than the present Owen Magnetic, which has been on the market during the last year. The similar Owen Magnetic will use a six-cylinder motor 3½x5-inch bore and stroke, with 126-inch wheelbase. It is claimed to turn in a circle with a diameter of 38 feet. This new car is specially designed to meet the needs of the town-car work and is well suited for inside drive types, such as sedans, etc. This chassis was developed with a view to meeting the requirements of those owners at present using electric cars.

The Fort Wayne factory of the General Electric Company is already tooled up to take care of the manufacture of electric units for these two models of Owen Magnetic cars, as well as to manufacture units for other concerns that may be licensed under the Entz patents to manufacture Magnetic cars.

## Trucks vs. Pleasure Cars

The business man buys his pleasure car for pleasure, and buys his truck for business. In the purchase of the pleasure car he does not quibble, and when confident the buy is a good one, will spend little time on the proposition. When it comes to buying a motor truck an entirely different proposition is to be met. A Detroit car maker said recently: "I have a friend who is in the automobile business selling both pleasure cars and motor trucks of one of the leading manufacturers. He has a customer who, for many years, has purchased a new pleasure car each year. This customer will call on the telephone once each year and ask about the new model, and order one to be outfitted with all of the latest and most improved accessories. He does not quibble on the cost of these nor on the price of the cars, nor does he see the car until it is delivered to him, when he promptly sends his check.

"From one year's end to the other he gives the dealer no trouble whatsoever. This same man decided that he needed motor trucks in his business, and called my friend on the telephone to ask about them. For months they quibbled over the expense of the truck, its possible saving to the business, the expense of its upkeep and on every other point, and the arguments lasted for hours. Mind you this man had been a user of the pleasure cars of this maker for many years and it would be inferred that he would naturally feel that their motor truck was equal in value with the pleasure car.

"In buying the latter he was buying for his pleasure, but in buying the truck it was business, and my friend the dealer became heartily disgusted with the arguments. He finally sold the man, but said that selling pleasure cars and selling trucks was quite a different matter. The point I make is this: Truck selling and pleasure car selling have nothing in common, and the sales of commercial vehicles must rank in the same class with the sale of staple products. Real salesmanship is required in the motor truck field and the motor truck business must be placed on an altogether different plane from the pleasure car industry."

## Truck Load Is Limited

Various citizens in Marshfield, Oregon, having property adjoining the downtown streets on which motor trucks are drawing trailers for transportation of logs have protested from time to time against the unusual damage which results from the traffic and the City Council, after wrestling with the problem for several months, passed an ordinance limiting the loads the loggers shall haul and prescribing the speed at which the trucks shall travel.

No load may be over 10,000 pounds in weight nor may they be hauled over the paving at a speed greater than five miles an hour.

# Trade Observations of a Traveler

*A Talk Before the Electric Vehicle Association of America*

BY E. P. CHALFANT

TO A greater extent than is probably realized, the entire future of this industry depends upon intelligent and constructive co-operation. My observations have been continued over a period of twelve months in all the important cities of the United States, in which I attempted to organize not only the dealers in electric cars, but also the garages and the charging stations, and I have had opportunity to observe their problems on the ground, and to some extent help them relieve them.

I find that one of the greatest local problems is the fact that the dealer himself can not properly conduct the garage and the charging station, and at the same time give the requisite attention to the sale of cars. In some towns it has been necessary for them to do that for the preservation of the business, but in the majority of the towns, particularly towns of a hundred thousand or under, some man without very much means who has had some experience in electric shops somewhere starts a charging station. Probably one or two more of them are started. The second or third starts immediately cutting prices to get the others' business away. I found in many localities cars charged, washed, stored, delivered, as cheaply as fifteen dollars a month. I found in the same town rates running from fifteen to thirty, or thirty-five dollars a month. I found it was practically impossible for anybody to properly conduct a charging station and make a profit out of it, unless they were charging from thirty to thirty-five dollars a month. We have tried to get the charging stations together in various localities for better rates and for giving the proper service because always the owners of cars are ready to pay the higher rate to get the better service. In most of these communities, as I have said, the dealers were not conducting charging stations. These stations were in the hands of men who were not properly informed and they were doing electric cars a great deal more harm than good.

There were about sixty-three towns that our association considered worthy of organization work. By that I mean towns where there were two or more dealers. The original list was only forty-five. That was increased to a total of sixty-three. There should be two hundred and sixty-three or four hundred and sixty-three towns in this country where electric cars are sold and used successfully. There are probably two hundred and sixty-three towns where electric cars have been sold successfully. I have been in town after town where electric cars are in bad repute where they were formerly used extensively, simply because they weren't properly cared for and had degenerated to a point where they were purchased by men who had but little means and who couldn't afford to buy a second-hand Ford. I have found that condition existing—men picking up used electric cars for a small amount where the batteries were so used up that they would give only a comparatively few miles to a charge and without means to buy new batteries. That condition has existed because of the lack of co-operation on the part of the central station. That has been the one greatest problem that has confronted the dealers in their sale of electric cars. In the towns where the central stations have co-operated electric cars are popular and enjoy a large and increasing sale. During the last year central stations have co-operated with manufacturers and with the dealers locally to a greater extent than ever before and today electrics are getting back into towns where they have gotten into disrepute, into towns where they have not been sold at all, and are working successfully, because the local central station has been brought to a realization of the importance of the electric, what it means to them for the sale of current, averaging to them about one hundred dollars a year per car for pleasure cars, and they are giving some intelligent co-operation to the dealers. They are putting in departments which instruct the dealers or instruct the charging station in the proper use or proper charging of the car. They are even instructing the owners of cars.

Mr. Johnson says, in those cities where the business of furnishing current for automobile battery charging has reached worth while proportions—and that ought to include all towns where they can be sold—"it seems to have been amply demonstrated that in every central station organization an electric vehicle department, headed by a competent storage battery engineer—even if that engineer is, in fact, the whole 'department'—is necessary." That is very true. If the central station will put in the department of education and show the charging station people how to do their work properly and intelligently to bring the cars to the highest state of efficiency and maintain them there with the least injury to the batteries, then we will get the only kind of co-operation that can do our electric the greatest good.

I had the pleasure in a number of cities that I visited of getting acquainted with central station people who are giving intelligent aid and co-operation to the charging stations. Two shining examples were Memphis, Tenn., and Worcester, Mass. In both of those cities and in other visits—I am speaking now of the smaller cities—the central station took an active interest in helping the charging station along. In Memphis, as a matter of fact, the central station conducted the garage. It had conducted it at a loss for two years and I was told by Mr. Chapin, who was in charge of that work at the central station, that during the past eight months it had realized a profit of twenty-four hundred dollars, and was now ready to turn it over to some individual or company who could afford to finance it. If the central stations would take on that burden in many towns where it would bring an important revenue to them, it would give us most valuable co-operation. I am speaking of towns where dealers themselves or charging stations cannot properly finance their work. If they would aid in that work, or would conduct the stations, or install them and conduct them to a point where they did realize a profit, they could then turn them over readily to some individual company. That is a form of co-operation that would be very beneficial to us.

I spoke of Worcester. I was handed there a report that had been made by the manager of the vehicle department to the president of the company, and it appealed to me as such an interesting statement of the opinion of the central station man that I sought a copy of it with permission to place it before you. It is addressed by A. D. Putnam

to R. W. Rollins, president and general manager, and it states the central station man's viewpoint of what comprises co-operation:

In reply to your note on a letter from the Philadelphia Electric Company, please find below a few statements:

Question No. 1: How may the central stations best co-operate with the electric vehicle manufacturer, the battery manufacturer and the operator of garages? I have had the pleasure of attending several conventions where these subjects have been discussed. Always and invariably this question is asked in this form, never in the form of "How can the electric vehicle manufacturer co-operate with central stations?"

The bulk of co-operative suggestions have always seemed to come from the vehicle manufacturer who wanted the central station to do all of the co-operation, giving reduced rates, free or nearly free garage service, and do all the advertising while the vehicle manufacturer would be pleased to sell the central station vehicles or trucks at regular list prices or at very nominal discounts, in some cases the discount offered central stations not being more than half that accorded agents. I have yet to hear of any practical co-operative plan or offer coming from the vehicle manufacturers in which they offered any real co-operation.

Good, fair co-operation towards the introduction of electric vehicles would consist of the central stations giving any and every electric vehicle manufacturer free juice and garage room for their cars during any demonstration that the vehicle companies would make in the territory. This would not include labor, repairs, etc. It would also seem to be equally fair co-operation on the part of the manufacturer to sell any central station a sample or demonstrator vehicle of its make at a price at least not above cost, and charge the balance to advertising account to offset or equal the advertising done by the central station. Demonstration of these vehicles is the very best advertising possible. A car on the road is worth many in show cases. It is inexpedient to attempt to push electric sales in a community where the central station is not at least in favor, if not enthusiastic in their use, and showing the fact by using electric vehicles itself. There is no better representative in any community for electric vehicles and battery manufacturers than an enthusiastic central station or parties directly connected with the central station. Such a representation has the confidence of the entire community; it has the facilities and backing of a large, established corporation which can give unlimited service of the very best kind, not only for charging and garaging, but for repairs, advice, and assistance in every line pertaining to the operation and maintenance of electrics.

There is a large field in all central station service for the economical, advantageous and satisfactory use of electric vehicles, but it is unfair to the industry at large to restrict the use of electric vehicles or batteries to any one make or company. Marshall Field said many times that one of the first rules he made in business was to give the people of Chicago what they wanted when they wanted it at a good profit to Marshall Field. None of us has shown any record of success that eclipses that of Marshall Field.

It would seem that a central station should demonstrate most effectively the general usefulness and adaptability of the electric vehicle, they should be able to exhibit as many different models and makes of cars as their requirements would warrant in operating and adapting each car to its best service. This would give many of the manufacturers representation and allow the freest comparison of the cars in actual service. In our work we are using eighteen electric vehicles of five different makes, fitting each to the work best adapted to its individual construction.

Regarding the sale of vehicles to prospective customers, this could be handled in many different ways. The central station should at least have one competent man who could talk with prospects understandingly regarding efficiency and cost of operation, advantages and limitations of electric truck service. Then the name of the prospect could preferably be turned over to the representative of the vehicle companies, who would make their own deals with the customer. The central station should make every effort to introduce electric vehicles, but without some remuneration other than current sold there is little incentive to incur great expense and trouble for present returns. For instance let us compare the amount of revenue from a 2,000-lb. truck at power rates and the household flat irons, on lighting rates.

We have several 2,000-lb. trucks in service and their consumption of current averages 600 kwh. per month, which, if sold to a customer at power rates of 3 cents per kwh. would yield a revenue of $18.00 per month.

Calculate the cost in time, correspondence, demonstration, depreciation of demonstration, vehicle unloading, assembling and delivery of selling one 2,000-lb. truck to a customer and compare the profit resulting from such sale under the existing co-operative rates, including subsequent consumption of current at a gross profit of 200 per cent (calculating current cost at 1 cent and sold at 3 cents per kwh.) with the little household flat iron.

This little, cheap, insignificant, unpretentious thing is sold readily over the counter by a girl at $8.00 per week and at an initial profit of 50 per cent. It consumes about 500 watts of juice per hour at lighting rates of 10 cents per kwh. The average use of a flat is about five hours per week, or twenty hours per month, drawing a monthly consumption of about 10 kwh., which produces a revenue of $1.00. Eighteen families using one flat iron each as above would produce a revenue to the central station equal to one 2,000-lb. truck in average service and at a gross profit of 900 per cent for current consumed. Boston Edison Company calculates $7 revenue per year per flat. This revenue from 1,100 flats sold in our office so far this year, revenue $7,700, equals thirty-five 2,000-lb. cars.

The most efficient scheme for introducing an electric commercial vehicle for interesting the public in general and producing the most sales of vehicles, batteries, and current is undoubtedly a properly devised battery service system, operated by the central stations, and in which all vehicle manufacturers who would or could (those who won't or can't must not complain at the success of those who will and can) make a standardized battery cradle could participate.

Free garage service and current for all vehicle demonstration on the part of the central station, rock bottom prices on vehicles and batteries for the central station's own use, a liberal agents' discount through the central station for sales of batteries and vehicles, and a division of advertising costs as may be agreed upon should form a real co-operative system under which *all* central stations and each and every vehicle and battery manufacturer could work together for mutual benefit.

In answer to the question "Is there a remedy for the apparent indifference of a considerable proportion of the central stations?" we would say that in our opinion there is, and this indifference exists because there seems to be no effort on the part of the manufacturers to extend co-operation to the central stations. If a workable agreement of efficient and actual co-operation on both sides, as above outlined, could be evolved there seems no other difficulty in the way of establishing efficient means of developing electric vehicle business. In other words, the indifferent central stations must first be shown (not told) that the electric vehicle is applicable to their work, that there is a profit to them in their sale and use, and they in turn will then be only too glad to show and convince other people of their efficiency, economy, and utility.

If the writer was in charge of the sales department of an electric vehicle factory he would try to evolve a scheme of going to the indifferent central stations with an offer of putting a truck or trouble wagon into their service at a nominal charge per month, sufficient to cover wear and tear, they to use it in their business, furnishing all current, etc., for from one to three months—follow their demonstration up with an offer of sale of that machine at an attractive figure and an agreement of prices and discounts for the sale of more machines. It is a seven to one shot that 80 per cent of the trucks would not only stick, but take root and grow.

This same man by his efforts has, in two years and a half, sold eighteen trucks and twenty-five pleasure cars in the city of Worcester.

While I do not concur in all of the things that Mr. Putnam said to Mr. Rollins, there is a great deal of good meat in what he has said and it brings home the one thought that has been going through my mind through all of this constructive work I have been doing for the manufacturers' association, and that is the need of a central station department either in the Electric Vehicle Association, in the N. E. L. A., in the manufacturers' association, or else the manufacturers themselves must each of them install a central station department. By that I mean a department that can send a man or men to properly conduct or show the central station, particularly

in the smaller towns, the benefit of income to be derived from the sale of current for electric cars, and the advantages to the industry itself in the promotion of sales. I found another thing that the central stations can do, as much as any other one of a hundred opportunities, to co-operate with us is to abandon all of this talk of cheap cars. They realize that they need a cheap car for their own service, a car that is inexpensively built, something suitable for delivery of meters and things of that kind, a car that some day we will probably be able to build for them, but they talk of that car as the car that should be sold to the general public. I don't think that the public demands a cheap car. The co-operation that we want of the central stations is to help us convince the public that the car that we are today manufacturing and selling to them is the car that today constitutes the popular demand.

## Rhode Island Faces New Laws

Radical changes in the motor car laws of Rhode Island are proposed in three acts now pending before the legislature. A new system of registration according to the calendar year figures in the registration fee, especially in the commercial cars, and new laws relative to headlights are included in the bills.

The new bill has the endorsement of the State Board of Public Roads and one of the important features is the greatly increased fees which it will bring into the state. The act increases the number of cars required to pay $10 registration fee, which is fixed at 15 horsepower instead of 20. A sliding scale of rates is established for commercial vehicles, wiping out the old flat rate of $7. Under the new act all classes of vehicles are to be registered on January 1. Another provision is that cars may be registered for periods of three months at pro rata rates. The act is to take effect January 1, 1918. Another section of the act requires the reporting of all serious accidents to the state board. In fatal accidents the board is required to suspend "forthwith" the operator's license until the operator shall be exonerated. Another bill requires that in closely built-up section and territory contiguous thereto, headlights shall be shut off or dimmed so as not to blind or dazzle other drivers of the highway. Another measure provides that the headlights shall not throw any light more than 3½ feet above the ground on a level road, and a distance of 50 feet or more, or over 10 feet on each side of the vehicle.

## Tire Prices Advanced

Expected increase of prices by tire companies, which have been much talked about for several weeks, have been begun by many of the smaller companies. Others are expected to follow until all tire prices are higher. Announcements have been made by the Empire Tire Company, raising its list 15 per cent; by the Falls Rubber Company, averaging 10 per cent; by the Globe company, approximately 25 per cent; the Pennsylvania company, 20 per cent, and Kelly-Springfield from 7½ to 26 per cent on various types.

In each case the reasons given are the scarcity and higher prices for ingredients used in tire manufacture. Crude rubber has risen from 57 cents a pound in September and October to 95 cents at present.

Similarly high rates prevail for Egyptian and Sea Island cotton and for zinc and sulphur. The chief trouble seems to be that the companies are not getting deliveries at contract prices, as there is not ocean tonnage available to transport them.

## Garage Owners' Annual Meeting

The Garage Owners' Association of Illinois held its annual meeting at the Congress hotel in Chicago, January 25. Better business and the uplift of the trade were discussed, considerable attention being given to insurance. Chairman R. A. McPherson of the insurance committee stated that if lower rates were to be secured garages must have better management and the organization must have more members and more co-operation. Robert A. Wilson explained inter-insurance.

In the report of Chairman H. E. Halbert of the purchasing committee, he stated that the purchasing committee was formed primarily for the purpose of calling to the attention of the first-class jobber that garagemen are not being treated right by many jobbers. He stated that when full harmony prevailed between jobbers and garagemen there would be no further field for this committee's work and that at such time he would favor its discontinuance. In the meantime he believed the committee should be well supported by the garagemen.

Robert Bland reported on the prospects of passing the garage lien law, which he said were good. Chairman Harry Salvat of the good roads committee attended seven meetings and reported an increased co-operation with the Chicago Automobile Club.

A resolution was passed thanking those manufacturers who have discontinued midsummer announcements.

A committee was appointed to confer with manufacturers' associations on question of difference in the manufacturing and retail trade.

A resolution was passed condemning manufacturers who sell cars to consumers at dealers' discounts in localities where the manufacturer has no dealer. The sense of the meeting was that this was a harmful business practice, and one or two manufacturers who were said to have done this were severely criticized. A protest will be made to the National Automabile Chamber of Commerce.

The next convention will be held in Rockford in June.

H. J. Perrett, of Woodward county, said his organization plans to bring out at each meeting something that would, if incorporated in the members' business, more than compensate him for the time and money expended in association work. He cited association purchasing as one point and added that the organization was planning to bring out points of business operation.

J. C. Thorpe, of Urbana, told about a tour with new demonstrating cars by the members of that town's association through all the principal towns in the surrounding country. The tour was given considerable advance publicity, stops were made on schedule time, and great interest was aroused. The members meet once a month at a luncheon and are addressed by a factory representative or some other person on business and production problems.

Fred. R. Young, of Moline, allied with Rock Island and Davenport in the Tri-city association, said monthly dinners are held for which each member must pay $1 whether he attends or not. Eight new members were secured at the last meeting, and there are now thirty.

Walter B. Taylor, of Rockford, told of organizing an association in Freeport. President H. E. Halbert, of the Chicago association told of how all Chicago members had put through a storage-in-advance plan that was working out well. This organization has 131 members and hopes to have 200 by the end of the year.

## Preserve Truck Tires by Not Overloading

Motor truck operators interested in getting increased mileage from solid tires and thereby effecting a lowering of operating costs, will do well to heed the remarks of S. V. Norton, who is in charge of the sales of Goodrich wireless tires. Mr. Norton says:

"The cause of most premature failures of solid motor truck tires can be traced back to one big cause—momentary overloading. By the exercise of a little care and forethought, a good share of this trouble can be ended and operators will not only secure increased mileage, but will reduce the number of lay-ups for changes of tires, and avoid controversies over adjustments.

"Rubber is a substance with possibilities too vast to enumerate, but as with any good thing, it has its limitations. For example, a rubber band can be stretched repeatedly, be used over and over again, and still retain its elasticity and strength. But if—even once, you stretch that rubber band beyond its limits of elongation, it snaps. This illustrates the principle of getting service from solid tires. Motor truck tires are built in load capacity per wheel.

"If you overload your machine beyond that point, or shift your load so that undue weight rests upon one wheel, you are running risks. The rubber in the tire, as the load weight increases becomes displaced to both the left and the right. Up to a certain point the tire will endure this and spring back into normal shape as soon as the weight on that spot is removed—as when a motor truck is running. This condition is comparable to the same use of a rubber band. This resiliency in the rubber absorbs shocks and jars, making riding easier and sparing the truck mechanism.

"But cause a too heavy load to rest upon the tire, and the rubber is distorted beyond its power of recovery. Figuratively speaking, it 'snaps.' It has lost some of its 'spring' just as heat draws the temper of a real spring. This momentary overload might have occurred just at one spot in the whole tire—as when a loaded wheel hits a bump or obstruction which resists passage of the tire until the force exerted (which is equivalent to weight) is sufficient to shove the tire over the obstacle.

"In this event the internal rupture of the rubber might not be immediately apparent. But the rubber structure, having been broken down, its elasticity sapped and its ability to hold together lost, would easily be cut by rough objects along the road, or would separate slightly around the base. Such cut or separation would have a tendency to spread gradually throughout the tire, rendering it unserviceable before it had delivered its mileage. If the overload is constant—as when a tire runs along under excessive weight—the entire tire is affected, and trouble will develop much sooner.

"It is difficult for motor truck users to appreciate these facts. The natural presumption when a tire fails is to blame the tiremaker. Especially is this so with the man operating his first machine and who knows little of the care or proper use of tires. In such a case the vehicle will be overloaded without thinking, the load will not be evenly distributed, and the driver will not be careful to avoid obstructions and rough spots in the road. A common error is for a man to take the number of tons carried for the day, divide it by the number of trips, and find that his average load was capacity or less. The law of average does not here hold good, however, for if only one of his loads unduly exceeded capacity, that single load would be sufficient to snap the endurance of the rubber in his tires."

---

## Trailers for Trucks Grow Popular

That the era of the trailer and the semi-trailer for motor trucks is upon us, even the most skeptical cannot doubt, if he reads the trade papers, which keep abreast of the development along these lines. A few years ago, users of trailers and semi-trailers were comparatively scarce.

While the economy and the efficiency of this method have been recognized, the rather odd appearance of trailers and semi-trailers has prevented their general use, but, as many of the more progressive business houses have begun to use them, in spite of this seeming objection, people are becoming accustomed to them and ceasing to regard them as odd.

Another objection formerly raised to this method of hauling was that motor trucks would not "stand up" under the increased load. Nevertheless, actual practical tests have proved that a car or truck can safely haul more than twice as much as it can carry, if no more than the normal load for which it was built is put on the driving wheels.

It was also feared at first that the ordinary wagon would not stand the strain of being used as a trailer, on account of the speed at which it would be drawn, but the wagon, too, has held up under practical tests. It has been found advisable for trailers to be built on general wagon plans.

The wagon is the result of many centuries of development, and it would be hard to improve upon it. Trailers for light roadsters should have roller or ball bearing axle and rubber tires, on account of the speed.

There are two methods of utilizing the trailer principle, the semi-trailer and the full trailer. The former is undoubtedly the best. It enables the driver to manipulate in narrow streets, driveways, lumber yards, coal yards, and other places, too narrow to allow the use of a four wheel trailer.

The most important advantage of the semi-trailer method is that part of the weight may be used for traction. If there is not enough weight on the driving wheels, they will slip on muddy roads, on wet asphalt, or on snow and ice. With the tractor semi-trailer enough weight is concentrated on the driving wheels to allow them to draw the entire load, with no chance of slipping. This is not true of the four wheel trailers.

---

## Day Baker to Lecture on Selling Electric

Day Baker, manager of agencies of the General Vehicle Company of Long Island City has consented to give a talk on the sales problems connected with the marketing of electric vehicles at the next meeting of the Electric Vehicle Association in New York City.

Mr. Baker's wide experience in several sections of the country in the introduction of the electric type of motor vehicle should make his lecture "Selling of Electric Vehicles" one of considerable importance and timely interest to motor vehicle salesmen in general, as the selling features of electric vehicles are closely akin to kindred parts and accessories.

Mr. Baker will show a large number of slides exhibited for the first time.

# Electric Trucks in Railway Service

*A Talk Before the National Convention of the Electric Vehicle Association*

BY T. V. BUCKWALTER

THE railroad people have divided the industrial truck into three general classes; one class used in passenger stations to handle freight and baggage, a second class used in freight stations to handle freight, and the third class used in shop service. The package and warehouse trucks are of quite distinct types and are characterized by dimensions to suit the service in which they are employed, whereas the shop truck is required to meet a variety of conditions, and has generally been solved by modifying one or the other of the package or warehouse types of trucks.

The first trucks were equipped with 85-volt equipment to charge the trucks from 110 volts direct current. While it is fair to say that the battery in the early days was much inferior to the battery of the present day, we must keep in mind the fact that nearly all of our troubles experienced with those trucks were battery troubles, due to the breakage of jars, connectors and similar parts, and the natural thought was if we reduced the number of connectors we would reduce the possibility of breakage, as the breakage of one connector put the battery out of service for the time being. Forty-eight volts was the next step. We found there was some reduction of breakage, but we still had more than we thought was desirable. Then the motor was taken up, to get the lowest voltage motor which the manufacturers could furnish, but with reasonable efficiency, and that was found to be 24; so 24 volts was adopted at that time, in preference to 30 and slightly higher voltages, for the reason that 24 volts required but 12 cells, and 12 cells permit of a greater variety of arrangements to suit the speed available on the truck than any other number. This was further modified by using a cell not square, say approximately 5¾ by 6¼ inches, which doubles the possible number of arrangements.

A small number of cells in the battery minimizes the possibility of jar and connector breakage, and the cost per unit of capacity, which is a considerable item, and the minimum weight per unit of capacity. That naturally brings up the question of the trouble of charging the low voltage batteries. It would be a serious matter if our voltages generally in railroad use were 110 direct current. However, nearly all of our current is alternating current, and where a transforming arrangement, either a rectifier or a motor generator, is necessary to charge any storage battery, it is as easy to charge 24 volts as any other. In cases where we do have direct current, which is highly desirable for train operation, the voltage in most general use is 220 and 250, and I believe that 250 will be the standard direct current voltage. It is impracticable to get a battery to charge direct from a 250-volt direct current line, therefore a motor generator is necessary, even on the direct current installations.

Something has been mentioned about the waste of current in low voltage batteries. We have not found it such a serious matter, for the reason that the battery depreciation, that is repair and attention to the battery, is a more expensive factor than the cost of current, particularly in large installations. For instance, in New York, where the Pennsylvania Railroad has a total of 66 trucks, the cost of battery material was $475.38, whereas the cost of current was $66.63, less than a quarter. That is a large installation where we have designed the charging equipment particularly for that truck installation. But in an installation which we consider an experiment, where there are only a few trucks, less than half a dozen, no particular arrangement is made for charging. The local electrical force get at the charging equipment to suit themselves. They do not consider it advisable to provide motor generators for small installations until the installation has proved successful and they commence to use a larger number of trucks, and then the cost of current can be reduced by the motor generator system.

On the subject of capacity our first thought was to get a truck as large as possible, with the idea of carrying nearly all of the material there was at once to save the number of trips. That was one of the first mistakes we made, and it was soon apparent that the larger truck was too cumbersome to handle in the narrow runways and that led us to the adoption of a smaller truck. We also found that the industrial truck required a steering mechanism which is very quick, in order to get around narrow runways and short curves. Therefore the lever steering mechanism is in general use, and with that steering mechanism a capacity in excess of 4,000 lb. is hardly considered safe. Another reason was that it is more difficult to stop a large load than a small load. These are two factors which affect the shape and size of truck, but in the packing trucks there is still another factor, and that is where trains make quick connections and a large transfer of package freight or mail, particularly mail, is necessary, we have found that it can be done much more quickly by partially loading the trucks and keeping the men busy. It is not desirable to hold a truck until it is loaded to capacity, but to load it only until the next truck is available, and in this way keep the force of men busy. A much quicker transit of mail is effected by that practice. We find that all of these factors limit the capacity to about 4,000 lb. This is further affected by the necessity of a large overload factor, which we consider to be fifty per cent—we think the truck should be designed for 6,000 lb., because we cannot control how much they will put on them at times, where time is available to load the truck with all it will hold. In attacking this problem, in general, we aim to meet the conditions which the operating people have laid down for us. If it requires difficult constructions, we would solve the problem in what we consider to be the most successful manner.

The saving of time effected by the shop trucks was readily calculated—the saving was calculated as efficiency-time. The greatest saving was in the case of a Harrisburg truck, which was $154.80 a month, and that was given a percentage of 100, and so on down to the lowest one of which we have a record, the Meadows shop. This shows a saving of only $21.75. Any truck saving less than $50.00 we consider inefficient, naturally, and subject to investigation. Many times the investigation proves that the showing is due to what we consider, as engineers, an improper accounting. For instance, in one case they were moving some material in a shop, and had about a half dozen laborers to each truck, and the shop clerks concluded the proper charge for these half dozen laborers

was against the truck, which would naturally run the truck cost up at a rapid rate. We have found it possible to eliminate a number of cases like that, but it is true there are a number which exist yet, which we have not found. The shop people generally hesitate to state what a truck actually does save. I do not know the reason, but it seems to be a state of being.

The saving effected by the baggage trucks is a matter very difficult to calculate, and the efficiency factor was, therefore, used as the cost of operation per truck month. In this case the best showing was made at Baltimore, which, however, is a new installation, and a total cost is shown to be $13.75 per month, that being the lowest, and the most expensive is at Harrisburg, $66.60. All of them, except Harrisburg, operated for less than $30.00 a month. The high cost at Harrisburg was due to a number of peculiar conditions. The truck was very severely handled and injured in accidents quite a number of times, and the cost ran up pretty fast; but notwithstanding that fact, they are considering it necessary to obtain more trucks at that point, and the fact that they are getting more trucks permits us to keep more experienced men on the job. The trucks in general have been handled by the electrical force at the various terminals, and the electricians at these terminals have a thousand and one other things to look out for besides the trucks, and the trucks do not get the attention they should have; and as the installation becomes larger we find it desirable to designate some one man, who shows an inclination that way, to look after the trucks, which always results in much better service being given to their maintenance.

There is a considerable variation in charges for current in the operation of the trucks, due to a wide range in the cost of current. In some places current is generated for 5 mills and in other places it costs us 10 cents. The shop trucks include the additional charge of the drivers, but the baggage trucks do not, for the reason that the trucks are handled by the regular baggage operators. The trucks are pooled and any operator handled any trucks, and it is impracticable to charge the operation, that is the wages paid to the operators, to the trucks.

One of the greatest advantages in the baggage truck service is the greater amount of work it is possible to do with the same railroad facilities. For instance, a station which was quite congested in its mail and baggage department, like Broad Street station, Philadelphia, is enabled to do a greatly increased amount of work, an increase brought about by the parcel post rates and regular increase in baggage and mail, without an increase in the force, simply owing to the introduction of the electric trucks.

Another factor which our operating people consider is very important is that it is easier to obtain a better class of men when electric trucks are used in place of hand trucks. The men who operate electric trucks know their work better and stay in the service longer and become more efficient, with the result that the mail and baggage is subject to less detention, and is less frequently sent to a wrong destination. For every 100,000 pieces of baggage which are despatched in New York there is only one error, and it is so small as to be negligible. The electric trucks permit the handling of baggage with satisfaction during rush periods, at the Christmas season and the end of the vacation season, without taking on green men, which we had to do when the hand trucks reigned supreme.

The Pennsylvania Railroad Company has obtained some interesting results from the service of an electric tractor, which is one of the largest electric machines ever built. The machine weighs slightly over 29,000 lb. and the tire equipment is 60 inches diameter and 12 inches width of rubber. It is designed for a drawbar capacity of 8,000 lb., at two miles an hour, and in order to obtain this drawbar capacity and workable speed, it was necessary to provide much greater drawbar capacity at start. On actual tests this machine overcame, in a tug-of-war, a small freight locomotive, the locomotive being of a type which was in general use about fifteen years ago. The drawbar pull of the locomotive was afterwards ascertained to be 21,600 lb., so that the drawbar pull of the tractor at the stalling point was slightly in excess of this figure.

High tractive effort is an important characteristic of this machine, and therefore the driving is done on all four wheels, likewise the dragging and steering. The machine couples to the cars direct, and handles these cars over paved streets on regular street railway tracks, of which we have a few installations in the east, one at Jersey City and another at Baltimore. This tractor is in service at Jersey City and handles nearly all the freight in the plant of Colgate & Company, the large soap manufacturers, the American Sugar Refining Company, and some two or three dozen smaller industrial companies.

It might be interesting to know the dimensions of some of the control apparatus. The steering wheel is 42 inches in diameter and is arranged on a horizontal axis, like the steering wheel of a ship. The man stands to operate it, as it would be out of the question to operate such a machine from a seat. The other part of the steering gear is designed in the same proportion as the steering wheel. The brake shoes, four in number, are 30 inches in diameter, and the main driving gears give an aggregate of 6 inches in width and 33 inches in diameter. The total cost of the tractor was $13,400.00. The total cost of operation for 30 months was $18,305.00, and the total cost of handling the same number of cars according to our old methods would have been $42,000.00, which indicates a saving of more than $23,800.00, or 71 per cent in one year. The cost of service per car is worked out at 80.5 cents. This includes the handling of the car in and out of the station. The tractor also handles a large number of cars from one point to another within the route, which the operating people do not consider a proper charge against the machine, but including all the cars handled the cost of operation per car has been 34.7 cents. The cost of operation per ton has been one cent and a small fraction. Since the machine has been in service it has handled a total of 37,841 cars which, strung out in one train, would make a train 287 miles in length. The average cost per working day was found to be $24.81, and the saving per day $32.25. The cost per car is greatly decreased, whereas the number of cars is not increased materially. The loss of service in the two and a half years totals nine days, all of which we experienced in the first few months of operation due to tire trouble. We learned a great deal about tires the first couple of months we operated this machine.

One reason for the abnormal weight of this machine is to reduce the possibility of slippage. The machine will develop, as we have learned, a maximum drawbar pull in the neighborhood of 20,000 lb., and it is, therefore, necessary to have the weight somewhat in excess of this figure to avoid slipping. Slipping destroys the tires at a very rapid rate, but the rolling motion is not so destructive to tires. The tire question is largely solved by the method of fastening. If the blocks are held firmly to the wheels at all times the tires give a very satisfactory life. The last tires we replaced lasted twenty-one months,

whereas the first tires let go in about three months due to our inexperience in fastening the blocks to the wheel.

The reason the tractor runs on tires and is not confined to the track like a locomotive is because it can do about four times as much work by running on a pavement as it can do by being confined to rails. They can spot a car anywhere on the route, and after spotting a car, and handling that car, the tractor can go anywhere else on the route, spot another car, and do anything else with it. It can handle cars in the stub end tracks where almost invariably a locomotive confined to the rails is on the wrong side or wrong end. Another important reason is that on a 50-foot radius curve a tractor driven by four wheels can outpull any electric or steam locomotive ever built. That is not a guess, we have determined it from experience. We have tried the steam locomotives, and they are unable to pull two cars weighing 70 tons around a 50-foot radius bend, whereas the tractor will do it.

One of the great difficulties with the old service with locomotives and horses—the horses finally took the place of locomotives, by the way, and were used previous to the tractor—was that the yard force was required to uncouple the braking apparatus in order to get the car around a 50-foot radius bend at some of the points. That took a great deal of time. With the tractor they put a car on and pull it around, whether the wheels roll or skid, it makes a little difference, the ability of the tractor to pull the cars around a 50-foot radius bend is sustained. In the case of some of the foreign equipments on the route I have noticed the wheels on the outside of the curve raise as much as 18 inches, while the wheels on the inside of the curve skidded around, and after the car had straightened out on the tangent, the car would come down on all fours, so to speak. It seems unbelievable that a car on a short radius curve will tilt over as much as 18 inches, and remain there, but that is so—you can uncouple the tractor and the car stays right in that position. I have noted it many times.

In regard to the 24-volt equipment, the conditions of service have been one of the controlling features in using the low voltage equipment. All the higher voltages have been changed over to the 24-volt batteries. The original 88-volt trucks were rebuilt into commercial trucks to operate on the street. The Pennsylvania Company is in favor of the 85-volt equipment for commercial use on the street and all its electric trucks are so built. I think it is an excellent thing to maintain standards as far as you can, but where the standards interfere with the service it is obvious that a new standard is necessary.

All the baggage and shop trucks are built as tractors. Automatic coupling devices are provided at each end. They are used as tractors to a very large extent; possibly not 50 per cent, but considerably over 25 per cent of their actual running is with loaded hand baggage trucks as trailers. The trailer is a necessity in a passenger terminal for the reason that mail or baggage will come in on a train, to be transferred to another train, not due to depart for several hours. It would be inadvisable to load this mail or baggage on an expensive baggage truck, and we therefore provide a trailer, and load this stuff which is to be held on the trailer, and allow it to remain on the trailer until the train is ready, and then we haul the stuff with the motor truck to its destination. The trucks were designed with that in view, and the steering arrangement is so contrived that the trailers drag with the tractor; in other words, you can make all kinds of turns around columns spaced on 16-foot centers, as in the Pennsylvania station, and the trailers will follow as a train behind the tractor. In the shop the shop trucks haul trailers to a large extent, particularly when the trailers are used for this stored material.

## Dangers of the Streets

The following article, abstracted from the London *Daily Telegraph*, may be said to reflect public opinion upon the matter of high-speed traffic in the streets of the metropolis and provincial cities. It is virtually an appeal for a vehicle which is incapable, even in the hands of a young and spirited driver, of reaching a speed on the level which will be dangerous to the other traffic and to pedestrians. Needless to say, that vehicle is the electric, says the *Electrician:*

Those of us who see much of London traffic in these days and nights have good reason to believe that it is not every accident which finds its way into print. For one which kills there are a score which merely wound, and in these strenuous times a street accident which adds nothing to the death rate is no more accounted of than silver in the days of King Solomon. Londoners born and bred, who used to think that no traffic conditions would ever disturb their experienced nerves, begin to go delicately when they step off the curb, and sit in a motor car a prey to horrid apprehension. The authorities continually do cry that the volume of London traffic has diminished. Yet the streets are by far more perilous than of old. Nor is this a consequence of the restrictions of lighting. At night, or in the dim twilight, the dangers are greatest, for the speed of traffic has not been checked adequately to the new conditions, and drivers in general give one another and the foot passenger no more consideration than was needed when we could all see each other. In daylight the perils of reckless driving and inordinate speed have increased, are increasing, and ought to be abolished.

The most perilous highways are those which, while carrying a considerable traffic, are wide enough to give opportunities for high speed. Try to cross one of these, drive along one of them with the most cautious hand at the steering wheel, and you will hardly avoid a thrilling moment, a hairbreadth escape from the imminent deadly smash.

It is the offside traffic which is the enemy, the driver who must always be sweeping past something in front of him or cutting round a corner upon his wrong side. That is, the root of the trouble is the craze for speed. The streets are full of chauffeurs who would rather run any risk than check their pace for an instant. Everyone of them seems to carry a message upon which the fate of the Empire depends. Any foot passenger, any vehicle which is slower than their own, must get out of their way. Theirs not to reason why, theirs but to do, and anyone who chooses may die. This school of chauffeurs was not unknown before the war. No one with experience of London traffic will contest that it has become much more noxious since the war conditions have affected traffic.

It is equally true that all chauffeurs are not to blame. Many drive with consideration for their fellows and a due appreciation of the new conditions of traffic; but that is no reason for mercy to the offenders. The reckless may plead some excuses. Slow-horsed traffic will persist in taking the middle of the road. The scarcity of qualified chauffeurs has imposed an extra burden of work upon those who are left, and the temptation to save time by running at high speed is great; but no plea can justify driving to the general danger, and of late that offense has become so common as to demand stringent action. The driver who expects that everything should give way to his desire for speed should be taught a stern lesson. The great need of the moment is drastic penalties for those, whoever they are, who will risk anything rather than check their vehicles. A few cases sternly dealt with would work a wonderful reform in London streets, a wonderful diminution of the casualty list. It is not a question of a speed limit. What is absolutely harmless at one moment and in one place and upon one road surface may be murderous under different conditions. But the long and growing roll of disastrous "accidents" makes it imperative that the authorities should give their attention to the craze for speed, and enforce upon every driver, whether he is steering his own six-cylinder car or a steam lorry full of rags and bones, that the safety of the public is the supreme law.

These breakers of speed laws are the only ones who can claim that the electric is not speedy enough.

## Motor Truck Men Seek Ferry Rates

Motor truck interests intend to put before the Interstate Commerce Commission a proposition for the readjustment of Hudson River ferry rates, so that vehicles will pay for the amount of space they take up. T. D. Pratt of Newark, N. J., president of the Motor Truck Club of America, outlined the plan recently and predicted it would be put before the commerce body in March or April.

The new rates, it is proposed, will be on a basis of so much per square foot for the space occupied by the vehicle on the boat. The motor truck traffic is less than one-fifth the size of the wagon traffic. Therefore, the slight extra charge, it is pointed out by the motor truck men, will be distributed among so many vehicles that the increase will be inconsequential.

In a way, the club's move is a sequel to the recent decision of the commission which made permanent the order restraining the Erie Railroad from adopting a new schedule of rates which would have increased the charges on motor trucks from three to twenty-five per cent and on horse-drawn vehicles from eighty-five to 200 per cent.

A transcript copy of all the documents and papers in the Erie case has been delivered to Mr. Pratt by Charles G. Bond of New York, counsel for the organization.

The plan, after it has been drawn up in its entirety, will be submitted to the ferry companies. This formality done away with, the matter will be taken to the commission.

## War Is Aiding Truck Builders

The European war is a great boon to the motor truck. The motor truck in turn is a great factor in the European conflict. Their use may decide the outcome.

The advantage to the side having a vastly superior number of motor trucks hardly can be estimated. Motor trucks have revolutionized warfare. Give to one side the full advantage of motor truck transportation, and take that advantage entirely away from the other side, the probable results would be self-evident.

The European war is also creating a condition of great future advantage to the truck industry insofar as it concerns domestic consumption. Horses are being destroyed at an appalling rate. It requires years to replace a horse, but it takes only a few weeks to replace a motor trock. It is well known that Europe is drawing on this country for as many horses as it can obtain and the very best it can get, creating a situation that will have a favorable effect on the domestic market for motor trucks.

It is the home market for motor trucks and the great possibilities of this market that right at this time is the controlling factor that governs policies in the matter of electric motor truck production.

## British Embargo on Rubber

The Rubber Club of America, a national trade association which includes all of the tire manufacturers, is much concerned over the embargo placed on shipments of crude rubber from plantations by the British government. Exportation of crude rubber from Great Britain and her colonies is absolutely prohibited. This means the cutting off of over fifty per cent of the normal supply of crude rubber required by the United States. Unless England consents to at least a partial release of this embargo it will mean many idle plants and a substantial increase in the prices of rubber goods, including tires. The reason for Great Britain's action is her determination to prevent Germany and her allies from obtaining any of the crude rubber grown in the British colonies of Ceylon and the Malay states. The Rubber Club desires to promise England that none of the rubber imported into the United States will be reexported and thus secure a partial removal of the embargo. At the present time the only source of supply for American manufacturers is South America, Mexico and Africa. The normal consumption of rubber in the United States is about 60,000 tons annually. Up to this time the English government has made the concession of permitting shipment to American firms agreeing not to trans-ship to any foreign country.

## Truck Men Meet

An important meeting of the Philadelphia Motor Truck Association was held January 19 at the hotel Adelphia, Philadelphia. Acting for president E. S. Hare, who was out of the city, Lee J. Eastman, vice president, announced the appointment of the following chairmen of committees:

Entertainment—R. E. Chamberlain, of the Garford Company.

Publicity—George Simpson, of the Goodrich Company.

Traffic—C. A. Barden, of the Chicago Pneumatic Tool Company.

Reception—L. L. Woodward, Fitz-Gibbons & Crisp.

Legal—H. C. Adams, of the International Motors Company.

Membership—F. W. Eveland, of the Eveland-Yerkes Company.

Good Roads—J. Philip Fowler, of the Eastman Motor Truck Company.

Attendance—Louis Heinman, Republic Motor Sales Company.

Action was taken on the death of Harry L. Cooper, a member of the association, prominent because of his connection with the International Motors Company.

The meeting was thrown open for a general discussion of methods by which membership of a desirable kind could be increased, of how a greater sociability could be built up among members, of the kind of speakers who should be obtained for the various meetings, and of the planning of entertainment features. Reports of committees showed excellent work for the year, the finances being in notably gratifying condition.

## Truck Makers in United States

According to an investigation made recently by an eastern publication, there are 248 different manufacturers of commercial vehicles in the country. This includes manufacturers who also make passenger or pleasure cars.

Michigan has the largest number, forty, but is closely followed by New York, in which state there are thirty-eight. There are five less in Ohio, the total being thirty-five. The next state on the list, Pennsylvania, has twenty-two plants.

It is estimated that 74,000 trucks were made in the United States in 1915, of which 24,000 were exported, practically all to Europe and most of them to nations now at war.

For 1916 the production of trucks is expected to be about 75,000, which is rather a conservative figure. The estimated value of this production is over $100,000,000.

# The Co-operation of the N. E. L. A.

*Suggestions Made to the Electric Vehicle Association*

BY E. W. LLOYD*

WHEN I listen to the wonderful papers and discussions of the Electric Vehicle Association I can not help but be impressed with the thought that these papers, of great value in that branch of our central station business of which I am a representative, are somewhat lost in that they are presented to an audience that is already convinced. I feel that they should be sent broadcast; that is, a selected number of them that have commercial value, and put in the hands of the central station operators who need education along the lines you are trying to work. How this can be accomplished, I can not say at the moment.

In traveling over the country, I am sure that the electrical interests desire the heartiest of co-operation in every direction. Those who are thinking about the subject realize, no doubt, the trend toward regulation of all kinds of business. It seems to me that that trend needs some watching on the part of those in our business. Not only the central station man, but the manufacturer is just as much interested and, therefore, ought to sit in on the proposition.

In the activities of the association that I represent this year we have the services of something over five hundred men on committees. I think it is fair to say that those men are, generally speaking, representative of the brains of this great industry. I am also sure in saying that those men lend every effort, and without compensation, in the heartiest possible manner to support progress and development in this great business.

It seems to me that the day is coming very soon when an association such as the National Electric Light Association shall contain all of the elements that go to make up our great business, in setting forth our propaganda legitimately, in influencing legitimately every effort to protect our business as a whole.

Some of the activities of the National Electric Light Association contemplate conferences with the Federal Government authorities and the formulation of rules, for instance, that are now being formulated by the United States Bureau of Standards. I think I am fair in saying that this association—I mean the National Electric Light Association—has had a great deal of influence in the last few weeks in connection with the proper formulation of such rules.

Now, I want to ask you how far you think the legislative branches of our states and Federal Government are going in the regulation of everything that has to do with our civil life? It seems to me that there are great movements in that direction, social evolution, that we can not understand the ultimate trend of, and that, therefore, associaions such as ours should be broadened, should have on their staffs experts who will be called upon to lend assistanct to member companies of those organizations.

It must be obvious to you in your manufacturing business and in the promotion of the use of the electric vehicle that the placing of a man, for instance, in Washington to promote the furtherance of the use of the electric vehicle in the postal service is absolutely essential. Our experience in the central station business in handling similar affairs with the Federal Government has been that we must go to Washington and convince the men there that the local man is not the man.

Now, if some plan could be brought about whereby the electrical interests could be brought together in a way that would help the business as a whole, I think everybody would welcome it.

Our national association in the past year has formulated itself into sections. We now have a commercial section. We have in formulation—I hope it will go through very soon—a manufacturers' section. We have an accounting section and also just recently formed a technical and hydro-electric section. In addition to that we have eleven or twelve geographic or state sections whose activities take into consideration the local conditions. The men in those local sections talk about all sorts of things that pertain to state affairs in their business. These men have representation on the executive committee of the national association and in that way keep in close touch with the general activities of the larger association.

As I look into the future it seems to me that the association will be formulated along lines quite similar to that of our Federal Government and the states. We must have in that large association in the very near future a band of men who will give service—I am repeating this because in my mind it is of very great importance—the service to the industry as a whole—and one company can not afford to stand it all. They can not afford to spare their special staff of men too often to do this work, and, therefore, it seems to me that this association of ours must build itself up to the point of a large electric and commercial organization that will handle all the vast problems that are coming on in this country.

I might speak a moment on the tremendous possible development of the west, the question of development of the water power and the posibility in that great country of the increase in the use of your vehicles as well as a large number of other industries that are not now in existence. For instance, we all know the possibilities of developing electro-chemicals, of improving something that is directly connected with your business, that is the improvement in methods in the manufacture of very much higher grade metals in the parts of your vehicles against the present methods. Of course, some of the metal is being developed in this country, but relatively small amounts as compared with European countries before the war.

Therefore, it seems to me that the industry is coming into a new epoch, that it is going to broaden out. Just think of the possibility of the development in this country in the transmission of electricity for all purposes. Consider that there are probably sixty million horsepower in water power alone without water reserve; that is, without storage capacity. Therefore, I say that we are in the beginning of a wonderful increase of sound development.

The electric vehicle has also appealed to me as a

*President National Electric Light Association.

wonderful instrument for the use of the central station in building up its load. I think we in Chicago have done quite fairly our turn in helping the thing along, and I am also quite sure that there are many communities in this country that need the assistance of the other organizations in educating the central station in the possibilities of the electric vehicle.

Now, how this can be brought about, I do not quite know; but I think something can be done to bind your association more closely to the members of our association, if the proper methods are pursued.

If your coming administration would take the matter up in the proper way, I am sure something will be arrived at which will be satisfactory to you and incidentally help the central station business.

## Electric Motor Versus Horse

Far-sighted people who have studied horse and motor traffic conditions in this country for the past few years have confidently pronounced the doom of the horse in the commercial field. This may seem to be a rather broad statement, considering the fact that there are over 26,000,000 horses and draft animals in use in the United States at the present time, and that there are approximately only 130,000 mechanical vehicles and 60,000 tractors used.

It is difficult for those who live in large cities and constantly see thousands of motor vehicles doing the work that was done by horses ten or fifteen years ago to realize that only a very small percentage of horses have been replaced by motor equipment.

To quote G. Arthur Beal of the bureau of animal industry of the United States government: "It is estimated that there are approximately 100,000,000 horses in the world. Of this number the United States possesses 26,000,000, or practically one-fourth."

The government estimates that the average food consumption of a horse is 10 pounds every hour he works, or a total of between 12,000 and 14,000 pounds per year, which is the average production of five acres of average agricultural land in the United States. It costs about 90 cents a day merely to feed a large draft horse. Shoeing a draft horse in urban service costs about $30 a year. It is said that the iron alone that is hammered by blacksmiths in the United States into horseshoes in one year is sufficient to make 40,000 farm tractors, or 60,000 motor trucks.

In order to maintain sanitary conditions in our cities, thousands of stables and street cleaners must be employed, another item of expense chargeable to the maintenance of the city horse, approximately $10 per horse per year. In addition, consider the tremendous amount of labor expended in haymaking and corngrowing, the labor of mechanics who make "horse feeding" machinery, of which a conservative estimate would amount to about $50 per year per horse. A recent government report states that the horse averages but four hours of useful work per day in city service. For 300 working days (which is a very high average) his labor is valued at not more than $3 per day, the figure at which horses are hired to the public. At $3 per day for 300 working days the horse gives a total service of $900 per year. Against this the cost of a horse per year, carefully estimated, is placed at $880, including equipment and driver's wages.

In some lines of business a horse's useful life does not exceed three years. Compare this with the longevity of the electric truck, for example, which is from ten to fifteen years. The total expenses which this country assumes for the 10,000,000 horses in use in our cities and towns is in excess of $7,400,000,000.

The economic waste resulting from feeding the total of 26,000,000 horses and draft animals in the United States is practically impossible to calculate. Using the government's estimate that one horse requires five acres of land for his upkeep, and the fact that five acres of land devoted to food product can be made to feed five people per year, the result shows an acreage sufficient to maintain a population of 125,000,000 people that is now being devoted to the raising of horse feed, or an acreage nearly equal to the combined areas of New York, New Jersey, Massachusetts, New Hampshire, Maine, Vermont, Rhode Island, Delaware, Connecticut, Pennsylvania and Ohio. To feed these 26,000,000 horses it costs $2,000,000,000 annually, or a sum equal to the operating expenses of 250,000 miles of railway in the United States.

## Easy Riding the Big Point

The electric car manufacturer has some mechanical problems to solve in building his car that are quite foreign to those of the gasoline manufacturer.

Probably the most difficult one is the quality of easy riding. It must be taken into consideration that all electric cars are of a considerably shorter wheel base than gasoline cars, which makes the problem of spring suspension an extremely vital one. It is a simple matter to get easy riding qualities where the wheel base is long, which gives the car an opportunity of having the front wheels pass over road obstructions at sufficiently long intervals before the rear wheels, that the shock is absorbed before it can be transmitted to the passenger.

Where the wheel base is short this is almost an impossibility unless the spring construction is of the type that will care for just these conditions. Unless the spring suspension has been properly designed, the short wheel base car rides choppily. In other words, there are successions of short shocks which are most unpleasant to the occupants of the car unless they are so cushioned with spring suspension that they are completely eliminated.

## Fences Necessary Along Streets

Robert S. Stewart, vice-president and general manager of the United States Motor Truck Company, Cincinnati, Ohio, prophesies the day is not distant when iron fences or railings will be imperative in large cities where traffic is the thickest. Mr. Stewart cites the alarming number of accidents suffered by pedestrians due to crossing streets at other places than at the proper street intersections, and says as the number of automobiles increase that this problem becomes more dangerous. He believes that this can easily be solved by installing iron fences or iron railings along the edge of the sidewalks so that the walking traffic cannot cross the street at any place except at the proper street intersections. This, he says, will give the city officials control of the pedestrians and their movements, which is the one and only way to safeguard them.

At the same time he believes that this will facilitate the problem of handling the automobiles in the street and that such a protection will be welcomed by all motorists. Although utility is the prime object of such fence or railing, nevertheless actual beauty and attractiveness can be added to the sidewalks by the selection of proper design or fences or railings, so that they will not be unsightly.

# United States Army Uses Many Cars

*Opportunity for Electric Trucks in Some of Its Work*

THE first motor truck in use in the United States Army was a five-ton truck purchased in 1907 and placed in service at the Philadelphia depot of the quartermaster corps.

The first gasoline motor trucks purchased and put in operation in the military service was in 1910.

In April, 1912, a test run was made with several makes of trucks from Washington, D. C., to Fort Benjamin Harrison, Ind., and later in the year another test run was made from Dubuque, Iowa, to Sparta, Wis., with a view to determining whether motor trucks, as at that time constructed, could be used in the military service in lieu of animal drawn transportation.

General use has been made by the quartermaster corps of trucks during the fiscal year ended June 30, 1915. a careful record has been kept of the operation of all motor trucks in the service of the quartermaster corps, and all trucks have been carefully observed and reported upon with a view to determining their efficiency, durability and economical operation. From experience obtained during the last fiscal year with this class of transportation in connection with transporting supplies between base depots and outlying camps on the Texas border, it would appear that this class of transportation is entirely dependable when operating over suitable roads.

Specifications have been adopted by the quartermaster corps for motor trucks for military service. These specifications provide for a truck with a capacity of one and a half tons, with a safe overload of 20 per cent.

At the present time there are 103 motor trucks, consisting of 24 different makes, in use in the quartermaster corps. In order to determine suitability of motor trucks for army use and the extent to which they should be used to displace animal drawn vehicles the operation of the trucks on hand was carefully observed and reported upon, commencing with the fiscal year 1912, and tests under service conditions are made whenever practicable. During the last few years a great deal of practical experience with motor vehicles has been obtained in connection with the transportation of supplies between depots and camps on the Texas border. This experience shows that motor transportation is entirely dependable for such purposes when fairly suitable roads are available.

It has been found that the one and a half ton truck is best suited for field use of the United States army, this size being fixed by the general character of country roads and the strength of bridges. It also fits in conveniently with the supply system of troops, being the same as the capacity of the standard four-mule escort wagon. For use in cities and at depots and arsenals the considerations just mentioned do not apply, and trucks are bought in sizes suitable for the work to be performed by them.

Specifications were adopted by the quartermaster corps, and under these most of the motor trucks were bought. The experience of this corps and recent developments in the trade make it necessary to revise these specifications from time to time. This revision is now under way and is being carefully and thoroughly done. In preparing these specifications correspondence has been had with all the leading truck makers of the country and the Society of Automobile Engineers. Working drawings and specications have been obtained from them showing their latest ideas. All data submitted by observers with foreign armies on motor transportation is also recorded for reference and use. This revision of the specifications is under direct charge of a trained engineer of this office, who is a member of the Society of Automobile Engineers, who attends the meetings of the society and obtains its publications, and also visits the plants of leading manufacturers for inspections and conferences with their engineers.

After completing the specifications from the best information and experience of this office they will be sent out to the manufacturers and the Society of Automobile Engineers for remark and recommendation from their point of view. After this they will be finally revised and used for purchase under contracts.

It is not to be understood that the army contemplates at this time entering generally into the procurement of a large number of motor trucks or automobiles for the use of the army. A very limited number of motor trucks and automobiles is sufficient to meet the requirements of the army in times of peace.

The means of transport required for the supply of troops may be divided into three classes:

1. That classs of transportation that immediately accompanies the troops and lays down the daily requirements in the way of rations, forage and ammunition. This transportation may be classed generally as the field trains or organizations.

2. The divisional transportation, which carries the supplies from the line of communications to the points where it is placed in the hands of the transportation described in paragraph 1.

3. The transportation employed on the line of communications, at depots, arsenals, mobilization points and concentration points.

The field trains of the regimental organizations of the army will, as a rule, be made up, as in the past, of animal drawn transportation, with certain exceptions where motor transportation can be employed to advantage and without any possible chance of failure.

The divisional trains described generally under paragraph 2 and those described in paragraph 3 will obviously be required only in time of war, or when war is imminent. It would obviously be unnecessary and undesirable to procure in advance the motor transportation required for these units at a time when their employment does not appear to me imminent, inasmuch as the constant changes and improvements in this class of transportation would render it more or less obsolete before the occasion came to make use of it. In other words, it is not considered a desirable policy to accumulate a large amount of motor transportation in advance of the period when it may be required for use.

It is believed to be desirable, however, to create reserve organizations that would be available for handling this class of transportation at the outbreak of war, or when war becomes imminent. It has been made apparent to the war department within the last few months that large bodies of patriotic citizens hold themselves in readiness to make themselves available for such reserve bodies.

The enormous rate at which motor trucks and automobiles suitable for military service, with practically no

change, are being manufactured in the United States, would indicate that the government would be able to procure as rapidly as required the motor transportation necessary for practically any number of troops that congress might decide to provide for any emergency.

It is considered most desirable to gather information, test out types of trucks, tractors and trailers that can be useful in time of war. It is believed in general that the type that would be most useful in the military service would be of the same type that would be useful in the operations of the western farmer over the country roads. Up to the present time these requirements have been more or less neglected, and most manufacturers have been principally employed in producing trucks and tractors that will meet the requirements of cities and operate over comparatively well made roads.

The first automobiles purchased for use in the army was in 1906, and at the present time there are 52 automobiles of various makes in the military service.

Standard makes of automobiles are purchased from time to time as required, after due advertisement. No specifications have ever been adopted by this department for automobiles.

## Electric Favored in Many Branches

In no city are electric vehicles more popular in proportion to the population than in Detroit. Everywhere one sees the beautifully designed electric pleasure cars driven by men or women, and the delivery wagons of all sizes. Detroit has advantages over many cities owing to the level stretches and the good pavements, and while these must be taken into the reckoning there are other strong points in favor of the electric.

Convenience, utility at all times and economy are arguments in favor of this type of automobile, and the fact that few of the users of these cars ever have given them up emphasizes the assertions of the makers and the distributors.

The electric of today is most desirable for either woman or man. Refinements which are pointed to by the distributors of gas cars do not outnumber those in the electrics.

In the first place the electrics are entirely dependable. There is so little to get out of order if one only will use common sense in the care and handling of the cars. The mechanism of the electric is extremely simple. The storage batteries transmit the electricity to the motor, which is controlled by the driver. That is about all there is to it, the operation being so simple that anybody can learn it in a very short time.

There is no dirt, nothing to perplex the driver, and the very ease with which electrics are controlled makes them particularly desirable for women. One and all they are anxious to drive a silent car, and there is something modestly independent and graceful about a woman driving an electric which does not obtain in other types of cars.

When it comes to convenience the electric has the field pretty well to itself. It needs only to be charged, it is always ready, and will go anywhere. For shopping trips and calls it is the very thing for women, and it affords them a chance to take the children out and give them plenty of fresh air.

There is no gainsaying the fact that the electric is an all the year-round car. No weather stops it. In the summer with the windows opened it is cool and breezy. In rain or cold the windows are closed and the occupants of the car ride in comfort.

The worst that winter can give us does not affect the electric. With all its quietness it has wonderful power and it can traverse the ice-bound pavements when general traffic is practically at a standstill.

When it comes to beauty in a motor car there is nothing beyond the electrics. Particularly is this so of the 1916 models with their new lines, their splendidly constructed and elegantly finished bodies. In point of style the electric is unsurpassed, in service it is entirely reliable.

Maintenance of the electric is reasonable. The garages charge a stated sum per month for charging, cleaning and bringing it to the door. If preferred the car may be kept in a private garage with no annoyance and even less expense. Modern batteries are highly improved so that the electric of today will take a person as many miles per day as he ordinarily cares to travel.

While the electric generally has been regarded as a woman's car it really appeals to all classes. For the doctor it is ideal, as it is instantly available and it will take him where he wants to go in quick time. Professional and business men who have electrics find them of utmost convenience not only during the business hours but also in the evening when they wish to go to theater or social events. The car is there in waiting when it is time to go home. Just get into the electric, close the door and you are ready for the homeward trip.

## Pasadena to San Diego

A trip recently was made from Pasadena to San Diego, Cal., by a Milburn light electric coupe.

This trip, according to Mr. Rose of the Los Robles Electric Garage Company, agents for the Milburn, is a remarkable performance for an electric. The San Diego dealer, A. B. Shaw, sold a Milburn for delivery in San Diego, and rather than ship the car down he decided on driving it. It was found that electric current could be obtained at Santa Ana and Del Mar. The distance between Santa Ana and Del Mar is slightly over 70 miles and a greater part of the way is very hilly.

Mr. Shaw left Pasadena with the Milburn about nine in the morning, averaging better than fifteen miles an hour to Santa Ana. Here Mr. Shaw stopped for lunch and had the battery boosted, leaving Santa Ana with practically a full charge. He drove to Del Mar without difficulty, taking a boost at Del Mar, and continued on into San Diego, reaching San Diego in time for dinner.

Mr. Shaw writes very enthusiastically regarding the trip down and states that the car behaved beautifully. Trouble of no kind was experienced.

Mr. Rose states that he does not recommend this San Diego trip as a regular thing for electrics, but it goes to show the possibilities of the light weight car.

## Electric Cars Defy Storms

There is no season of the year when the advantages of the electric car are so strongly emphasized as at present. Zero weather and snow storms have no terror for the electric car.

The construction of the modern electric car is such that the difficulties usually attending automobiles in winter are unknown quantities with the electric. There is no radiator to freeze, no cylinders to chill, no carburetor to get out of adjustment; in fact, all of the items which bring terror to the heart of the winter motorists are not to be found in the electric. It is for this reason that, as the automobile becomes a necessity to the family rather than merely a sportive luxury, that we see the electric car more in evidence.

# Electric Vehicle Association Developments

*Sectional Development Work, Reports of Committees and New Announcements*

**This department will hereafter contain all activities of the Electric Vehicle Association of America, in all of its sections, as reported by A. Jackson Marshall, national secretary.**

**Realizing the valuable co-operative development work which the association is doing, the publishers of ELECTRIC VEHICLES offer this exclusive section to association members and all electric vehicle interests in order that they may keep closely in touch with association matters.**

BY A. JACKSON MARSHALL

At the December 21 meeting of the Chicago section which was held at the Hotel Metropole, the chairman, George B. Foster, made a few remarks about the low attendance which probably was a forerunner of the holidays to come. He then called upon the secretary to read a letter of suggestions from Gail Reed, to the effect that dealers in trucks could send in prospects for pleasure vehicles to the secretary's office for distribution, and that dealers in passenger cars could send in prospects for electric trucks for the secretary to distribute. Mr. Foster thought that we ought to require the dealers to call up for this information themselves. Mr. Cerf of the Waverley company thought that as he had considerable trouble in reaching the secretary, it might be better to mail the information out as contemplated.

The suggestion of the holding of a field night was discussed. It was thought it would probably be better to have one big time and not try to have one a month. Mr. Cerf suggested a prize for the greatest number of prospects turned in by any one person. It is to be understood that the benefitted company is to stand the expense from sales that it made in this connection, and further that the prize periods be made quarterly or every three months, in order to keep up the interest.

Mr. Bentley suggested that the Commonwealth Edison Company should give a certain percentage of what the others gave as their share. Mr. Cerf said he thought his company would be willing to give $5 in those cases where the tip finally resulted in a case for its car. Mr. Foster thought there might be cases where complications would arise, and that in order to get started right, we should probably turn the matter over to a committee.

A letter was read from A. M. Duller concerning local conditions, in which he pleaded for more garages and better charging facilities. Mr. Macrae said this was the first time any electric truck manufacturer to his knowledge had ever called attention to the necessity of electric garages. Mr. Foster said it was a big question and also that he thought metered service in electric garages would have a material bearing on settling the question. Mr. Macrae agreed with him and further maintained that it was imperative to take truck business on a meter basis. There being nothing further to come before the meeting at this time it was adjourned.

The January 4 meeting of the Chicago section, also held in the Hotel Metropole, was presided over by George B. Foster, chairman.

The chairman opened the meeting by calling the attention of those present to the recent Reid and Murdoch "Gigantic Coffee Sale" where electric vehicles were used exclusively for the deliveries. Attention was called to the value of parades or demonstrations of that kind.

P. J. Delacour read the following paragraph in one of the recent National Electric Light Association bulletins, with reference to the Ward special campaign:

1. This vehicle can be stored and washed in fifty livery stables in New York City for $10 a month.
2. For an average daily mileage of approximately 20 to 25 miles, the current cost will not exceed $10 per month.

The question was asked if such a low cost of upkeep and operating could be obtained in Chicago, and Mr. Duller was appointed a committee to study that question.

Harry Salvat of the Fashion Auto Garage gave, with his habitual good humor, undeniable proof of the improving conditions of the electric vehicle business, and the same speaker also complained about his last month's bill because of the "heavy penalty" added to the amount he thought was already high. Mr. Foster of the Commonwealth Edison Company explained the very special rate the garage owners have been granted and that it was only fair for them to pay the regular wholesale rate, when they were not complying with the "off-peak" contract rules, which explanation was approved of by everyone present.

Suggestion was made to have members make a systematic perusal of magazines or other electrical reviews, and to have them make reports or read the articles of value referring to electric vehicles to meetings of the Chicago section. Mr. Duller and Mr. Delacour volunteered to begin this work.

D. C. Arlington, chairman of the recently appointed publicity committee, spoke on the "publicity campaign" and outlined its scheme as follows:

Six or seven electric truck salesmen of Chicago are requested to give a list of as many good prospects for the sale of electric trucks as possible, or those having some sort of transportation requirements in which electric trucks could be used. From these various lists it is hoped to compile a good list of two to three hundred names. So far the result of this work has been the obtaining of some eight participants, and with the 200 name list and on that basis the cost would run about $4 each every two weeks. The idea is to edit some sort of circular every week, which is to be mailed out to this mailing list, the work being taken care of each week as to the mailing, sealing, etc., by each participant in his turn. The supervision of all publicity matter is to remain in the hands of the committee in order that there may be uniformity and surety that the proposition will be gotten out on time.

The subject matter to be of such a nature as to lead gradually up to the subject of an electric truck. The committee's further idea in the matter would be to have a special committee of experts, whose duty would be to get in touch with any prospect as soon as possible after receiving any sort of inquiry from him, and to investigate the prospect's conditions, to see if an electric truck would fit his requirements. Mr. Arlington hoped that through this proposition, if kept up during the next year, the committee might be instrumental in placing fifty trucks.

Mr. Arlington also said that the committee's efforts were to be along the line of getting merchants to advertise electric delivery service as much as possible in all of their regular forms of advertising. He thought that the two schemes were really a chance for the Chicago section to do something that would be of value, and ended his remarks with the request that the chairman call upon Mr. McJunkin of the McJunkin Advertising Agency, who was present, to give his ideas on this same subject.

Mr. McJunkin said that he thought the idea was a good one, and recommended that this scheme be carried on under the name of the Electric Vehicle Association, as it was easier to get prospects to make inquiries of an association than of any individual company. Mr. McJunkin also stated that the committee should have a wider scope and include perhaps 1,500 names.

Mr. Arlington agreed that it ought to be an E. V. A. A. proposition, but said that it was the committees' desire to start in a small and inexpensive way, and then if it was found satisfactory, to lead gradually up to a larger proposition. Mr. McJunkin suggested that the kind of envelope and appearance should be varied from week to week, otherwise the prospect will become acquainted with the series of mail and possibly dislike to read anything further on the matter and systematically throw each piece away as it comes. The question of sending this mail to the prospect's home address was discussed, but it was decided to send it to the business address, as the prospect was more likely to see it there and think it over seriously.

Mr. Foster called attention to the current meeting notices, in that references are now being made to good magazine articles on kindred and allied subjects about our industry. Also that someone was to be assigned from time to time to report before the section on such of these articles that seemed to be of especial value to the members.

L. F. Meissner, Jr., of the Edison Storage Battery Company, gave an abstraction of "Charging Edison Storage Batteries," which paper was written by E. J. Ross, Jr., and appeared in the January issue of Electric Vehicles.

### PHILADELPHIA SECTION

The January 12 meeting of the Philadelphia section was held in the Engineers Club, at which time Joseph L. Tracy, chief engineer of the Electric Storage Battery Company, presented "High Horse-Power Ability of Modern Electric Vehicles," which was illustrated and proved highly interesting.

At this time it was announced that the meetings of the Philadelphia section hereafter would not necessarily be held each and every month, but at such times, upon special call, when the executive committee has secured prominent speakers and papers of considerable importance.

### CINCINNATI SECTION

In Cincinnati, the electrical show was held during Electrical Prosperity Week, November 29-December 4, 1915, and was the most successful ever held in that city, over 36,000 attending the exhibit. The show led to a great many sales by the concerns exhibiting electric vehicles, namely, the Waverley Company, Milburn Company, Walker Vehicle Company, and the Automatic Transportation Company. The event renewed interest in the electric vehicle development in Cincinnati.

### NEW YORK SECTION

The New York section met on December 28. Chairman D. C. Fenner opened the meeting and called attention to the cups on the table. These cups were donated by Arthur Williams of the New York Edison Company, one having been contested for by the salesmen of central stations exclusive of the salesmen in the automobile bureaus and the other by the company section teams making the best record. The first was presented to Edward Friend of the New York Edison Company and the second to Harvey Robinson for the New York Section team, made up of the Brooklyn, New York & Queens, United and New York Edison Companies. Mr. Robinson made a speech of acceptance in which he thanked Mr. Williams for his recognition of the effort to make a good showing. He made enthusiastic references to the past Ward campaign and declared that the good results of the work were becoming more and more evident every day.

Secretary David F. Tobias then addressed the meeting and said an invitation had been extended to the members of the E. V. A. A. to attend the winter convention of the Society of Automobile Engineers, January 5 and 6. He urged the members to take advantage of their opportunity to discuss pertinent questions at this convention.

Chairman Fenner emphasized the last announcement, praising the automobile engineers' organization and enlarging on the very complete technical library which was at the behest of any who might care to use it and located in the Engineering Society building.

Mr. Fenner then introduced E. W. Curtis, Jr., of the British branch of the General Vehicle Company, who addressed the meeting and told many most interesting details regarding conditions in England.

S. C. Harris then presented "Methods of Design and Operation Which Assure the Efficiency of the Electric Vehicle," which was reproduced verbatim in the last issue.

After the paper had been fully discussed, attention was called to the electric taxicab development, the battery rental system, and the fact that an electirc taxicab, one of the fleet being used in Detroit was outside of the building for inspection purposes.

Follows a list of the chairmen of the local New York section committees:

Committee on Employment Registration—S. C. Harris, New York Edison Company, 32 Horatio street.

Committee on Garage and Charging Station—E. A. Darby, Baker R & L Company, 19 Central Park West.

Committee on Insurance—Harvey Robinson, New York Edison Company, Irving place and Fifteenth street.

Committee on Legislation—Day Baker, General Vehicle Company, Long Island City, N. Y.

Committee on Performance and Operating Records—F. F. Sampson, Exide Battery Depots, Inc., 527 West Twenty-third street, New York City.

Committee on Statistics—R. H. Marriner, 59 North Fifth street, Roseville, N. J.

Committee on Traffic—D. C. Fenner, General Vehicle Company, 30 East Forty-second street, New York City.

Committee on Programs—Harvey Robinson, the New York Edison Company, Irving place and Fifteenth street, New York City.

The New York section held its last meeting on January 25. Day Baker of the General Vehicle Company presented "The Selling of Electric Vehicles," which was profusely illustrated.

WASHINGTON SECTION

The January 20 meeting of the Washington section was held in the commercial office of the Potomac Electric Power Company, Secretary Charles M. Marsh presiding in the absence of the chairman.

The meeting was called to order at 8:25 P. M., and the minutes of the last meeting read and approved. It was announced that the next meeting of the Washington section would be held February 10, 1916, and the next party on January 27 which would consist of a supper and theater party. No admittance except by ticket; no tickets sold after January 26, as the nature of the party necessitated certain arrangements being made in advance.

Mr. Boubar was then introduced and presented "Electric Cars as Units for Taxicab Service," which created considerable discussion.

After tendering to Mr. Boubar a vote of thanks, a program of motion pictures was enjoyed by all present.

Follows a list of the national committees of the Electric Vehicle Association of America:

CENTRAL STATION CO-OPERATION

E. S. Mansfield, chairman, Edison Electric Illuminating Company, 39 Boylston street, Boston, Mass.

L. A. Ferguson, Commonwealth Edison Company, Chicago, Ill.

W. W. Freeman, Union Electric Light & Power Company, Cincinnati, Ohio.

Joseph D. Israel, Philadelphia Electric Company, Philadelphia, Pa.

J. Harry Pieper, Southern California Edison Company, Los Angeles, Cal.

Frank W. Smith, United Electric Light & Power Company, New York City.

Mathias Turner, Cleveland Electric Illuminating Company, Cleveland, Ohio.

CONSTITUTION REVISION

Frank W. Frueauff, chairman, Henry L. Doherty Company, 60 Wall street, New York City.

H. M. Edwards, the New York Edison Company, 124 East Fifteenth street, New York City.

T. C. Martin, National Electric Light Association, 29 West Thirty-ninth street, New York City.

FINANCE

H. M. Edwards, chairman, New York Edison Company, New York City.

W. C. L. Eglin, Philadelphia Electric Company, Philadelphia, Pa.

L. A. Ferguson, Commonwealth Edison Company, Chicago, Ill.

Frank W. Smith, United Electric Light & Power Company, New York City.

## Show Records Broken at Chicago

This year the sixteenth annual automobile show at Chicago was not only an exhibition of splendid automobile models, but closely resembled a dealers' convention. The dealer element has always been an appreciable feature of the Chicago exhibition, and this year the total number in attendance was 50 per cent greater than that of 1915. While the exact number is not known, it has been carefully estimated, however, that there were about 15,000 from all parts of the middle and western states. The show itself was a great success, the daily attendance being about a third greater than the 1915 exhibition. Chicagoans are convinced that the show was bigger and better than that held at New York City.

Besides the Coliseum, the Annex and First Regiment Armory, the Greer building was utilized, providing 94,000 square feet of floor space, every foot of which was occupied by the 294 chassis and the 300 accessories and parts shown. It was estimated that the total value of exhibits, gas and electric, was approximately $3,000,000.

In the matter of decorations, the setting was Japanese and the colors were in quiet harmonies of greens and soft blues set off by apple blossoms contrasts. The severe lines of the coliseum and armory interiors were broken by large vases filled with pink blooms set at intervals on the main floors. Backgrounds for the principal displays were formed of Japanese temple gates and monster Japanese lanterns. The main aisles were lined with substantial imitation brick walls to keep back the throngs, and the balconies were masked in huge panels in which the mountains, maidens and Japanese pagodas were the principal subjects. Over all was a huge canvas blue sky, against which thousands of electric lights glittered.

Keen interest was shown in the accessory and parts divisions, which were located chiefly in the basements and the balconies of the buildings. There was a constant throng around the reservations, which were taken up as usual by the majority of the more prominent manufacturers and distributors. The car exhibits took up the largest share of attention. As was the practice in former years, the manufacturers who produce the largest volume and those who are the more representative and better known had the choice positions. Of these the electrics were prominent in the armory.

## Sutcliffe Succeeds Andrews in Edison

William Claflin Andrews, advertising manager of the Edison Storage Battery Company, Orange, N. J., died in New York City on December 21. A graduate of Columbia University, Mr. Andrews afterward became sales engineer of the Stanley Instrument Company of Great Barrington, Mass., and later became connected with the General Electric Company in Schenectady, N. Y., and Harrison, N. J. He was for two years secretary of the Rae Company, New York City, leaving to join the Edison Storage Battery Company in April, 1913, where he was advertising manager until his death. Mr. Andrews enjoyed an unusually large acquaintance among electrical men, and was particularly active in the Electrical Vehicle Association of America and in the Jovian League.

Paul Sutcliffe succeeds Mr. Andrews.

## Care Important Factor in Tire Economy

"For a long time we have carried to truck owners a campaign showing how proper care of tires makes for increased mileage," says R. S. Wilson, of the Goodyear Tire & Rubber Company.

"We are trying to build mileage into our tires and have developed improvements and features in them, in the last few years, which have resulted in motorists getting almost universal satisfaction from them. Common sense and good judgment are as prolific of good results in driving a truck as in any other undertaking—and are just as necessary.

"For some owners Goodyear tires travel 15,000 miles—for others 3,000 miles. It seems to me that next to the tire itself, the care given it is the most important factor in obtaining maximum mileage. The tires may be made of the same material—yet one may give five times as much service as the other. The difference is that between a good tire plus tire care, and a good tire minus tire care.

"Now while the winter season is here and the dangers of skidding on snow-covered and wet streets multiplied, many truck drivers are using devices to overcome the tendency to skid. Every type of non-skid device is, of course, more or less injurious to truck tires, but the least harmful is a loose chain which can work around the entire surface of the tread, distributing the shock. When stationary devices are used the shock received is concentrated at one point of the tire causing an unusually severe strain there, and resulting in the breaking and crushing of the rubber. The entire load is carried by a part of the tire equal to the size of the non-skid block or chain. The entrance of sand and gravel into the breaks of the rubber causes them to deepen and lengthen and the tire is soon reduced to scrap rubber."

## Goodrich Net Profit Over $12,000,000

The directors of the B. F. Goodrich Company, at their annual meeting, declared a quarterly dividend of 1 per cent on the common stock, payable February 15 to stock of record February 5, and a dividend of 3½ per cent on preferred, payable 1¾ per cent on April 1 to stock of record March 21, and 1¾ per cent on July 1 to stock of record June 20. No dividend has been paid on Goodrich common since the close of 1912. The net profits for 1915, after making proper provision for maintenance, charges, depreciation, bad debts and other items, amounted to approximately $12,200,000. This amount, added to the surplus carried over as of December 31, 1914, of $3,100,000, shows undivided profits of approximately $10,500,000 after deducting the four quarterly dividends of 1¾ per cent on preferred stock outstanding, together with a provision of $1,100,000 for the redemption of preferred stock and a further amount of $1,700,000 set aside for various reserves, which are shown in detail in the annual report. The directors voted to retire 7,000 shares of preferred stock prior to July 1, 1916. This makes a total retirement of 27,000 shares, covering the charter provision for retirement of preferred stock up to July 1, 1916.

## New Changes in Organization

The Bearings Company of America is announcing the following changes in its organization, which has occurred recently: John W. Hertzler, who has for several years past been western representative of the Bearings Company of America, has been appointed assistant manager, and is now located at the factories of the Bearings Company of America in Lancaster, Pa. Mr. Hertzler is being succeeded in the Detroit office, 604 Ford Building, by William C. Little, who has represented Brandenburg & Company and the Buda Company in the Detroit territory in the immediate past.

## Jacksonville Show March 6

Plans for the automobile show to be held at Jacksonville, Florida, March 6, are gradually taking form. H. B. Marks has been engaged to put on the show and has secured an office at 509 Main street, where all business will be transacted. All of the local dealers have taken space in the proposed show and thirty-five manufacturers will exhibit cars and trucks. Speed motor boats will also be given space in the show room. The local committee in charge is composed of the following dealers: C. C. Kirby, chairman; M. S. Altmayer, C. R. Jones and Fred Gilbert. This will be the first auto show in Florida and one of the first ever given south of Atlanta.

## Anderson Expects Prosperous Year

In a recent interview with W. C. Anderson, president of the Anderson Electric Car Company, he stated that, "At the present time we have already booked orders for nearly 90 per cent of the volume of business we did during the entire fiscal year just finished.

"Judging from the data I have in front of me now I would say that a very conservative estimate of our output for this year would be about 3,000 enclosed automobiles, averaging a little over $2,000 in price. This number far outstrips the previous sales volume of any other company building enclosed cars, either gasoline or electric."

## Trucks Go Too Fast

Harry A. Roe, motor vehicle commissioner for Maryland, has taken a decided stand against motor trucks and jitney buses. He has made an investigation and has found that the heavy trucks are going too fast and that the jitneys are being overcrowded. He has sounded a warning. The speed limit for trucks weighing from 4 to 8 tons has been fixed at fifteen miles an hour as the maximum and those weighing over this amount at twelve miles an hour.

## National Show for Trucks Proposed

Sentiment favoring a national exhibition of commercial cars, to be held annually in Detroit, in event the Merchants' and Manufacturers' building is completed in 1916, is gaining strength daily throughout the country. Some time ago Stanley C. Wilson, secretary of the J. C. Wilson Company, proposed Detroit as the scene for such an exhibition.

A military motor unit, comprising the owners of the motor cars and owners and dealers in motor trucks, will be formed in Massachusetts if the Massachusetts State Automobile Association is able to put through a bill that has been drafted by its counsel. The corps will be divided into sections to cover the entire state. Drills will be held from time to time when the motor cars will transport members of the militia to various places quickly.



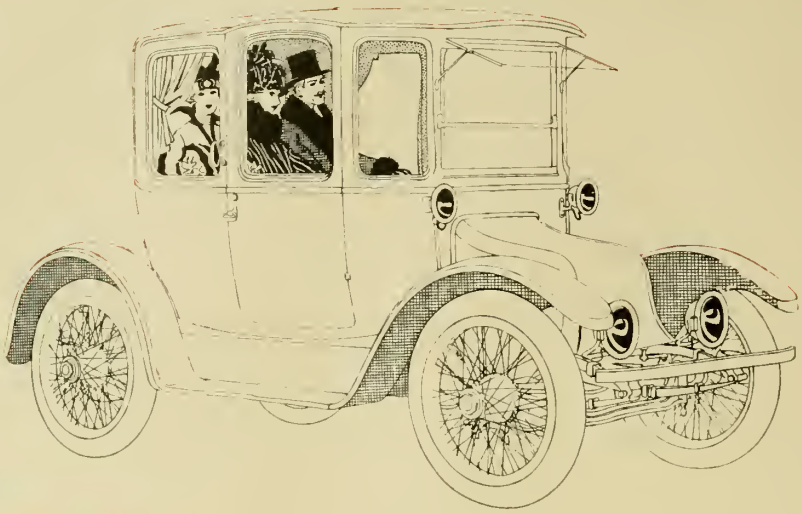

ELECTRIC VEHICLES _____ 1916
Monadnock Building,
Chicago, Ill.

Enclosed find $1.50 for which please send ELECTRIC VEHICLES to my address for one year.

Name_____

Address_____

_____



CHICAGO ELECTRIC

## The Best Built Electric in America

THIS car offers as optional Rental Battery Service, eliminating the purchase of a battery and assures maximum battery service and full maintenance at a fixed low price per month.

# Of Decided Interest

are the new

# *Chicago Electrics*

## EDISON MODELS

THE smallest details are successfully brought to an exceptional degree of perfection, offering refinement and comfort exclusive to this Electric. The more pronounced parts are materially improved giving an unusual value, both in style and construction.

The strong financial standing of this company makes possible the offering of our deferred payment plan—$500 down—the balance $100 a month.

## Prices, $1,615 to $2,275

## Walker Vehicle Company, Chicago

*Manufacturers of Chicago Electric Passenger Cars and Walker Electric Trucks*

Chicago Salesrooms:—2700 Michigan Avenue, Telephone Calumet 3000

# ELECTRIC VEHICLES

A MAGAZINE FOR THE ELECTRIC AUTOMOBILE OWNER. $1.50 PER YEAR. 1253 MONADNOCK BLDG.

*Vol. 8* *CHICAGO, MARCH, 1916* *No. 3*


# DETROIT ELECTRIC

## Man's Demands for Boundless Utility and Maximum Efficiency Have Developed the Perfect Detroit Electric

With millions in capital invested, the Anderson Electric Car Co. of Detroit, largest builders of enclosed automobiles in the world, has achieved its high place in the automobile industry by putting 100 per cent efficiency in every department devoted to completing the most economical and luxurious medium of transportation known to mankind.

It builds the automobile that points the way to all others.

It has done much toward revolutionizing human endeavor.

The Detroit Electric makes for optimism because, wherever it goes, it annihilates pessimism.

You become obsessed with the idea that no man or woman who wishes economy of operation—escaping extravagant and outrageously high charges for gasoline—and the last word in luxurious travel, may afford to ignore the 347 logical and conclusive reasons why the electric automobile should be the buy.

*Demonstrations to suit your convenience—the 1916 line of our models never was excelled by any displayed.*

## Anderson Electric Car Company

(Manufacturers Detroit Electric)

*World's Largest Builders of Enclosed Pleasure Cars*

Direct Factory Branch
2416 Michigan Avenue
Calumet 4789, CHICAGO, ILL.

CENTRAL DISTRICT

Factory Sub-Branches
MILWAUKEE, WIS. EVANSTON, ILL.
SPRINGFIELD, ILL. OAK PARK, ILL
ROCKFORD, ILL.

# Electric Truck "Prosperity"

The first practical gasoline automobile was built about 1886—the first real Electric truck 15 years later. Neither had much of a great demand success until 1909 or, say, 7 years ago. It takes time to introduce things so revolutionary.

The great bulk of the Electric trucks of the world have been built in the past *five* years. Each good Electric sold eventually sells two more, so production will increase rapidly once a certain distribution is reached.

Electric Truck "Prosperity" is here, already, for if you discount everything else, G. V. *reorders* alone would keep a big plant running. In addition there are thousands of business men who are being converted to the economic side of Electric trucking. Others are installing Electric trucks because this is in line with the entire electrification of their plant or store. Don't forget that the future of the Electric truck is limited only by the future of Electricity itself. The business man who claims that the Commercial Electric is "impractical", "no good", "needs a nurse" and so on, very frequently gets a short arm jolt when his competitor installs Electric Delivery.

G. V. Electrics have demonstrated over 10 years' life in hundreds of cases. They have covered as high as 21,000 miles each per year. They are efficient in hilly cities like Pittsburgh and Cincinnati. They are efficient in Winnipeg and Manila—two climatic extremes. Every so called weak point of the Electric has been given the lie in actual performance—*somewhere*.

Get the facts—you doubters—get the facts! *Specific adaptability* is all that is needed to place the Electric (the G. V. at least) absolutely at the head of efficient trucking. Let it be our pleasure to show you Why. Our new catalogue awaits your address.

*General Vehicle Company, Inc.*

*Long Island City, N. Y.*

*New York, Chicago, Boston, Philadelphia*

Copyright, 1915

Published Monthly By
ELECTRICITY MAGAZINE CORPORATION
Monadnock Building
CHICAGO

Entered at Chicago Post Office as Second Class Mail Matter

# ELECTRIC VEHICLES

WITH WHICH IS INCORPORATED IGNITION
TRADE MARK REGISTERED IN THE UNITED STATES PATENT OFFICE

SUBSCRIPTION PRICE
Domestic - $1.50
Canada - - $1.75
Foreign - - $2.00

FOR SALE AT ALL NEWS STANDS

If Your News Dealer Will Not Supply You—Please Notify Us

Volume VIII | CHICAGO, MARCH, 1916 | Number 3

# High Cost of Gasoline Aids Electrics

*While the Price of Gas Continues to Soar the Cost of Electricity Continues to Decrease*

**The situation engendered by the high cost of gasoline opens up an unprecedented opportunity for the general introduction of electric vehicles.**

**The accompanying article might be characterized as the first gun in a campaign which we are confident will materially advance electric vehicle interests.—A. JACKSON MARSHALL, Secretary, Electrical Vehicle Section, National Electric Light Association.**

MOST automobile owners are only too familiar with the present gasoline situation and are not particularly overjoyed at the future outlook, as the opinion seems to prevail that the price of this commodity will continue to soar. The average person, however, may not yet fully realize with what grave concern those most intimately connected with the automobile industry are likely viewing the condition of greatly increased prices, and it may be assumed that the best brains in the country are engaged in trying to solve the knotty problem of increased demand and reported insufficient supply, bringing into effect the old law of supply and demand which usually regulates price.

There are approximately 2,500,000 automobiles in this country and it is estimated that by the end of this year there will be more than 3,000,000 cars in operation. Basing conjecture on the present estimation of automobile factory production, it seems reasonable to expect another million at the end of 1917. What the production of the succeeding years will be, only time can tell, but one thing is certain, that enormously increased demands will be made for gasoline unless some other energizing medium is adopted.

The total domestic production of gasoline, states the *Horseless Age*, less the quantity exported, was 35,100,000 barrels in 1915, and a simple calculation gives the number of gallons available for each car as approximately 589—perhaps enough for 9,500 miles, perhaps not. Fifteen months ago there was a reserve stock of about two million barrels of gasoline, while three months ago this had been exhausted, so that now there is no reserve to draw upon. In 1914 the Electric Vehicle Association of America understood that the production equalled 960 gallons per car in active service, with a considerable reserve. The foregoing calculations take account of gasoline only in relation to automobiles, and do not include the 300,000 motor boats at present in service and the 30,000 farm tractors operating in different agricultural districts. A glance will show that the motorist is in an even more desperate position than would seem to be the case to the casual observer, and it appears obvious than if in one year there was a reduction in the supply of gasoline of 371 gallons per car, or nearly 39 per cent, ignoring the above mentioned tractors and motorboats which are calculated to greatly increase, and the numerous stationary engines for general industrial purposes, etc., the probable further decreased supply per car for succeeding years will be much lower with its corresponding effect on the possible mileage per car, restricting the almost unlimited freedom which the gasoline car operator has heretofore enjoyed.



Nor can we probably look to any other source of supply than our own country. In fact it is reported that the oil fields of Texas, Oklahoma and Kansas must help supply foreign demand. In connection it is interesting to note what a preponderance the United States holds as an oil producer. The following are the Government figures on the world's output for 1913:

| | *Barrels of Crude.* | *Percentage of World's Output.* |
|---|---|---|
| United States | 248,500,000 | 65.12 |
| Russia | 61,000,000 | 15.97 |
| Mexico | 25,500,000 | 6.74 |
| Rumania | 13,500,000 | 3.53 |
| Dutch East Indies | 12,000,000 | 3.14 |
| Galicia | 8,000,000 | 2.05 |
| Other countries | 12,500,000 | 3.18 |



In 1915 we exported over 350,000,000 gallons of gasoline to Europe, which on the basis of 960 gallons per car per year, would supply about 360,000 cars, or only one-third of the estimated increase for 1916. It is interesting to note that Canada, where the lowest retail price for gasoline is now 35 cents per gallon, is dependent upon the United States for her entire supply. There has recently been some talk of the possibility of an export tax imposed by the Government, which if enforced would only temporarily relieve the situation, because the demand ever increasing would, sooner or later, catch up with the supply, and we would then be face to face with the problem confronting us now.

With the prediction that forty-cent gasoline is not very far distant, both the manufacturer and operator are turning their thoughts to the ways and means of economizing on fuel. Automobile magazines are emphasizing to their readers the importance of giving more care to the general mechanism of their cars in order to avoid a waste of gasoline. Manufacturers and engineers are studying every possible means to make each part of the car perform its function with absolute efficiency, to lighten the weight of the car, and to make the car more simple, with fewer parts, less friction, lower wind resistance, etc.

"Simplicity," states a manufacturer who sees virtue in gasoline at forty cents, "is something that generally comes to an industry after years of development. Sometimes just such a thing as forty-cent gasoline is necessary to force the attention of all interests on simplicity."

Without doubt many valuable economic developments and refinements will be effected even in the present highly developed gas car, whose unprecedented advancement will go down in history as one of the greatest achievements of the ages, but it is a question if these improvements will offset the well nigh assured increase in the price of gasoline.

While there may be to the gasoline car manufacturer and owner some uncertainties as to the exact line of development which the future will bring, the electrical industry realizes that the use of electricity as an energizing medium for locomotion is making steady and sure progress, and is systematically consolidating gains preparatory to meeting the greatly increased demands of the future.

The well known prediction of Thomas A. Edison made in 1910, and reiterated on several occasions by the Electric Vehicle Association, that in fifteen years from that time more electricity would be used for charging electric vehicles than for lighting, gives new evidence of materializing, especially when we consider that the possible available amount of gasoline or other similar fluid is an unknown quantity subject to total or partial exhaustion, while electricity, or more properly the means of producing electricity economically, are practically unlimited. While the cost of gasoline advances we will continue to find the cost of electricity decreasing, and with the inherent simplicity and dependability of the electric vehicle, the fulfillment of Edison's prophecy becomes more and more of an actuality.

While there are some types of passenger cars which do not use great quantities of gasoline, and will therefore not feel the scarcity of this fuel to a great extent, there are, however, thousands of other passenger cars which get but comparatively few miles per gallon, and which will greatly feel the pinch in the amount of oil now available. For example, the gasoline taxicab in most cities is now finding it difficult to operate with any reasonable profit because of the expense per car mile, which brings it that much closer disaster. It will be found that the increased cost of gasoline will be a very serious problem to this type of car, for if the average taxicab obtains as high as 10 miles per gallon, which at the rate of fifteen cents, we will say, would represent 1½ cents per mile; with gasoline at forty and fifty cents, the cost per mile for fuel alone will be from four to five cents, representing an amount generally greater than the gross profit of most gasoline taxicab concerns.

While the touring car owner, if needs be, may curtail his pleasure, the operation of gasoline commercial cars is not likely to be so easily limited; for merchandise must be transported and now that the extensive use of horse-drawn equipment is impractical, the motor vehicle is all the most extensively employed. If, for example, a 5-ton commercial gasoline truck which operates under usual conditions gets about 3½ miles per gallon of gasoline (average of the figures obtained by the Massachusetts Institute of Technology for a 5-ton unit), assuming the fifteen-cent rate for gasoline, this would represent a cost of about four cents per mile. We will assume that the truck operates 35 miles per day, at a cost of $1.40 for gasoline. With gasoline at forty cents the cost per mile would be 11 cents, or a total cost of $3.85, being an increase of $2.45 in gasoline item alone. On a basis of 300 working days per year, the total cost of gasoline would be $1,155. If the average initial price of a 5-ton gasoline truck were $5,000 the cost of gasoline to operate a truck of this capacity would represent 23 per cent of its initial cost. If the daily mileage were increased, as is the desire of truck owners so that their investment by being more active would yield greater returns, the consumption of gasoline would be proportionately greater. If fifty miles were covered the cost of gasoline at forty cents would be $5.50 per day and $1,650 per year, which emphasizes the seriousness of the situation. It should, however, be borne in mind that the cost of gasoline is a comparatively small item in the total cost of gasoline car operation.

According to the extremely comprehensive report (Bulletin No. 4) somewhat recently made by the Massachusetts Institute of Technology and already quoted by the Electric Vehicle Association, based on an extensive impartial investigation of relative fields of horse, gasoline and electric trucks, the average cost of electricity per mile of a 5-ton unit was 4 1/10 cents. Consequently an electric truck on this basis operating 35 miles per day would cost $1.43 and for 50 miles per day $2.05 for current. As the demand increases the cost of current will decrease, which will further widen the gap between the electric and gasoline propelled vehicle. The ultimate and permanent solution of the conditions engendered by the gasoline situation is the extensive use of electricity which is rapidly superseding other forms of energy.

---

Announcement that representatives of one of the European powers were in Southern California to buy all the available horses in that section brought satisfied smiles to truck dealers, who see business ahead. Five million is the figure mentioned, and if that amount is turned loose among the farmers and horse raisers they will have much money to spend, and as they will be short of horses they will naturally turn to the trucks for relief.

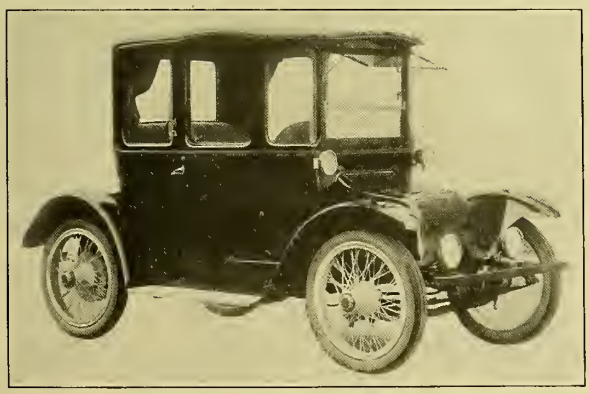
# Chicago Electric Announces 1916 Models

*Two New Edisons Added*

TWO new "Edison models" add distinction to the 1916 line of Chicago electrics. Through the development of highly specialized electric car manufacturing, the Walker Vehicle Co. is offering in these new models, super-quality throughout. The quality construction that has always distinguished Chicago Electrics, has not only been sustained but the engineering developments of the past season have still further improved the cars. The construction, for example, has been standardized and specialized throughout, making possible the strictest economy in purchase, sales and overhead expense. This standardized manufacturing policy enables the highest grade construction to be offered at decidedly moderate prices.

The new body design represents the latest conception of approved closed car construction. Conventional lines, low hung, give the long, smart effect so much desired by the discriminating users of fine motor cars. Simple fittings that harmonize with each other, complete the luxury and good taste of this new body design. All angles and sharp corners have given way to graceful curves. The arched doors have been modified to give a straight line roof with only a slight arch perceptible over the door. This continues the arched door construction which has always distinguished Chicago Electrics. The body construction throughout represents the last word in refinement. Many structural improvements have been added, particularly with a view to the use of solid tires, for it has been found that more strength than ordinary carriage building affords, is necessary in the electric motor car constructed for the use of solid tires.

Aluminum is used exclusively for all parts exposed to the weather. To long running boards are attached the new crowned fenders which are fully skirted to the



*Fully Enclosed Chicago Electric Rear Drive.*

bodies, completely protecting them from mud and water and are finished in the new special finish process that gives a deeper luster and more lasting finish than ever before.

The sashless windows which are used throughout are operated by improved mechanical lifts which through the touch of a lever, will open or close the windows. Improved window mountings set the glass deep in a special construction that prevents loose windows, rattles or leaks. No keep stakes nor metal strips are used on the interior of the windows but the upholstering is fitted flush to all windows.

Every article that will add to the luxury and completeness of the interior will be found in these bodies, such as dome lights, reading lamps, arm rests, arm



1916 *Cabriolet Roadster in the Park.*

slings, the late type concealed toilet case, clock, recording instruments, etc. The front window is the improved rain vision type and carries on the exterior an auxiliary rain shield which assures clear vision under all weather conditions.

No radical changes have been made in these models over those of the past season, with the exception of such body improvements as have already been described, and numerous refinements. Model 163 is the ideal four-passenger rear seat drive for all general purposes. This model is exceptionally spacious and will seat with every comfort, four passengers, as well as providing an emergency seat for a fifth.

Prices with full standard equipment for Model 163 are $2,185.00.

Model 164 Cabriolet Roadster shown in this article is designed primarily as a real utility car with all the frills and furbelows left off. This model offers the most desirable combination of open roadster and closed coupe. The rear seat is wide enough to carry three passengers comfortably, while an auxiliary folding seat will carry a fourth. This car is specially constructed for power, speed and mileage.

Price with full standard equipment is $1,885.00.

These two models are all built on a wheel base of 96 inches which combines the qualities for maximum riding comfort with the special feature of being able to turn completely in a very short radius, viz., 34 feet. This short turning radius is a very important essential in the ease of handling the car, particularly in congested districts. Horizontal control is used which includes five speeds and a substantial mechanical brake operated by hand. In addition, the car is equipped with powerful foot brakes.

This is the new front seat drive, five-passenger

limousine. This model conveys the long, low hung, smart effect so much desired by the users of fine limousines. Additional room is afforded in this model, the body averaging eight inches longer than the other models, and the seats a trifle wider. This model will offer ample room for the comfortable seating of five passengers. The wheel base of this model which is 104 inches, and an interior body length of 78 inches, gives the most luxurious comfort of any electric limousine built. While unusual body length is found in this model, which is essential to comfort and luxury, this car can be turned completely in 38 feet. It will be noted how well adapted this extreme short turning radius will prove, particularly for city driving. Complete and luxurious body equipment in every detail will be found worked out in this model to suit the most fastidious. The price with full standard equipment is $2,275.00.

While improvements have been made and new features added, the Chicago Electric chassis follows very closely the successful principles which were established from the start. The frame is built into an extremely rigid unit, which gives a stiff foundation of great strength, particularly adapted to the use of solid tires. Very careful study has been given to get proper weight distribution. The selection of steel used throughout has been given particular attention. Marked improvements have been made in the lubrication of the car, particularly the steering apparatus, the number of places requiring grease being reduced to a minimum and equipped with large size grease cups, all accessible and within easy reach, making it unnecessary to get under the car. The bronze bushings that have shown wear in the previous models, have been improved by the use of types that will give greatest wear.

The same type of slow speed series wound motor as last year is used, improvements have been made with a view to heavier duty. The new motors are larger and of greater capacity having the advantages of higher efficiency with minimum weight. The slow speed type assures reduced wear on bearings, brushes and commutator. Considerable time and study during the past year has been given the development of proper motor construction for the use of the new G type Edison battery. The new motors have been improved in consultation with Edison's engineers for the use of the new type cell so that all purchasers of Chicago Electrics could avail themselves of Edison's latest improved storage battery and have the assurance that they are procuring the electrical equipment that will be perfectly adapted for that battery.

The control, a continuous torque type with magnetic blow-out, remains practically the same with the exception of improvements made in its lubrication. The controller is situated in weather proof metal casing directly against the motor, materially reducing the length of wiring and is readily accessible through a door in the floor of the car. No resistance speeds, with their resulting heating, are found. It consists of five forward and reverse speeds, with brake operated by horizontal control lever, Yale locked. Speeds give a range of 5, 8, 15, 18 and 22 miles per hour, except on the Cabriolet Roadster, which reaches a maximum of 25 miles per hour.

This same control lever operates a ten-inch contracting band brake on the propeller shaft. Due to liberal proportions, service records show a minimum average of 15,000 miles before relining is necessary.

The foot brake system remains the same, one ratchet lever operating brake and emergency electric cut-off, the other foot lever operating without ratchet, as is customary with the ordinary service brake. These foot pedals operate 14x2½ internal expanding brakes on the rear hubs.

The same trouble-proof features are incorporated in the control system, which positively assure the correct operation of the car. For instance, the car cannot be reversed until it has been brought to a total stop.

The worm bevel gear axle construction has been so satisfactory that it has been continued for all 1916 models. It has been found after a year's use of this gear, that the hardest usage has not effected its high efficiency or silence.

Timken tapered roller bearings are used throughout the axles and wheels. The steering is the vibrationless lever operating on SKF self-aligning ball bearings.

One of the most important of the recent developments in electric storage batteries, is the placing on the market of the new Edison G type cell. This new cell was perfected to meet the special requirements for electric passenger car service. The Edison equipment consists of 60 G7 type cells and in addition to the well-known general advantages of the Edison cells, the new G type reduces internal resistance approximately 50% and for that reason is considerably less effected by temperature changes. This type of battery permits considerably higher capacity without taking up additional space and will have a most important bearing on the future of the electric passenger vehicle.

The lead battery equipment consists of 40 cells, 11, 13 or 15 plate Exide or Philadelphia, the number of plates furnished depending on the conditions the car will have to meet relative to mileage. In extremely hilly towns, the large capacity batteries are used, assuring exceptional mileage capacity. Non-wash type of jars are used. The battery weight is equally distributed, 20 cells rear, 20 cells forward. No batteries are carried directly over the axles. The position of the batteries permits the use of more flexible springs, as well as prevents the pounding of axles when the car encounters poor pavements. This position of the batteries permits their being carried at an average of fourteen inches or more lower than found in ordinary electric car construction, thus assuring the lowest center of gravity, eliminating top-heaviness, preventing undesirable swaying and insuring the finest riding qualities.

In the city of Chicago, the Walker Vehicle Co. was the first to offer the purchasers of electric cars the opportunity of adopting the rental battery service, by selling to those who desire this system, all 1916 models at a reduction of $270.00 from the new list price. By this policy the purchaser of the electric car can rent complete battery service at a minimum charge per month and need not stand the investment that is necessary when he purchases a battery with the car. Furthermore, the new rental service which is now offered in Chicago by several battery concerns, covers the entire maintenance and repair expense incident to the hardest use that batteries can be given.

In other words, the owner of the electric car pays so much per month for the use of the battery regardless of upkeep or maintenance expense and regardless

of whether the car is driven fifty or one thousand miles a month. When the mileage of the battery through wear fails to cover requirements, the old battery is replaced by a new one, thus keeping a constantly fresh battery in prime condition for the use of the car at all times.

The Walker Vehicle Co. has been giving this battery service a thorough try-out and so far has been very well pleased with the results obtained. Although it has been found in cases where not more than 5,000 miles are covered per year, that it is just as well to purchase the battery with the car. It is believed that this new system will prove one of the greatest economy factors introduced for the use of electric cars, particularly to those desiring longest mileage, and it is hoped that in the near future, this system will be possible in all points of the country to users of electric cars.

This rental battery service at present applies only to the Chicago district. Cars shipped to all other points being equipped with batteries in the regular way.

Tire equipment consists of 36x4½ Firestone notch dual tread, cushion tires and where wire wheels are desired, the Rudge-Whitworth are furnished with 34x 4½ Goodrich Silvertown cord pneumatics.

The tread on all models is standard, 56 inches.

## Changes at Philadelphia Battery

Frank E. McCall, the energetic secretary of the Chicago section of the E. V. A. of A., has left the Commonwealth Edison Co. to accept a position with the Philadelphia Storage Battery Co. which has just moved into new and enlarged quarters at 1621 Michigan avenue. The company will have the entire second and third floors of the building, enabling them to give better service to their patrons. Mr. Arlington who is in charge of the office has arranged them in quite an efficient manner.

## Walker Issues New Catalogue

The users of commercial vehicles will find the new twenty-four page catalogue of the Walker Vehicle Co. of Chicago unusually interesting this year. The line offered embraces a great variety of models shown in clear half-tones from the little thousand job to the stalwart 5-tonner and the tractor for dock and warehouse haulage. They focus particular attention for their individual balanced drive which they use exclusively. The catalogue is attractively bound in heavy brown covers and is well worth reading.

## True Up the Wheels

"Whenever unusual tread wear is detected motorists should at once make certain that the wheels are true," declares Chicago Branch Manager Williams of the Goodyear Tire and Rubber Company.

"Your tire dealer or garage man will usually be pleased to examine them, or, if his service does not cover this, will suggest where it can be done. As an addition to our own service and to supplement that of the dealer, with the purpose of aiding motorists to ascertain easily and promptly whether the wheels of their cars are parallel, each Goodyear branch has been equipped with an alignment tester of the latest improved model, an instrument used in determining if the wheels are out of line. All motorists, whether users of Goodyear tires or not, may now have their wheels tested at any of the various Goodyear branches, and in a few minutes learn whether out-of-alignment is one of their troubles.

"When the wheels of a car are not parallel, the tire must undergo a diagonal grind as it passes over the road surface. Sometimes an axle becomes bent by a severe blow—or the steering apparatus gets out of adjustment. Often demountable rims are not put on straight. In any case, the tread soon grinds off and you have a choice of three courses. You must run on the fabric of the tire with its susceptibility to puncture and weakening by the moisture that works its way into the fabric, causing separation of the plies, or you must have the old tire retreaded or replace it with a new one. But, whatever course you select, the wheels should immediately be placed in alignment."

## Ohio Electric Gets New Chicago Location

The Ohio Electric Car Co. of Toledo is preparing for a heavy Chicago season in the new series of cars going through the factory, by leasing the present American Electric headquarters at 2634 Michigan avenue. It will move sometime about the first of May, giving up its entire present space at 1509 Michigan.

E. C. Scheffler, who has come from the Auto Garage & Sales Co. of Canton, Ohio, in which he was interested, has already assumed charge of the Chicago office. He states his new location will give him enlarged selling quarters as well as an enlarged service department and have the additional advantage of display windows facing two sides. The new models will necessitate more sales space as they undoubtedly will be brisk sellers for the factory already is working night and day to put them through. No radical changes are being made, said Mr. Sheffler.

The American, which is relinquishing its location, has had two locations in mind for some time for continuing its service work but inquiry at the office failed to furnish information as to which one will be chosen. An announcement will be made shortly.

## Jamaica May Use Electric Vehicles

Consul J. C. Monaghan, Kingston, Jamaica, says that because of the excellent roads and the popularity of automobiles here, the prevailing high cost of gasoline makes the present an excellent time to introduce electric vehicles in Jamaica. This applies to both pleasure cars and trucks. Gasoline is sold at about 48 cents United States currency per gallon. Water power in Jamaica is plentiful but undeveloped. Electricity for charging is available, but not on a commercial basis. In considering a market for motor vehicles here the steep grades must be kept in mind, although the average grade varies from 1.2 to 1.6.

Agriculture is the most important industry of the island. Bananas, cocoa, coffee, and cocoanuts are the principal exports. The most important industrial plants are for the manufacture of aerated waters, cigars, and cigarettes, biscuits, shoes and leather, and there are also sawmills and foundries. In the latter boilers and small machines have been manufactured.

A list of firms in Kingston which might be interested in the sale of electric vehicles may be obtained from the Bureau of Foreign and Domestic Commerce or its district offices. Refer to file No. 73487.

## Highways will Boost the Truck

With California's great highway system progressing, the State Highway Commission is finding more and more use for the motor truck in the work. With improved roads the officials declare, there is not a type of general hauling which cannot be done better and more economically by motor vehicle than by horse-drawn wagons, and to this end they are equipping their construction department as much as possible with motor trucks.

Probably one of the biggest boons the state highway will bring to California is that of providing roads over which it will be possible to truck cheaply and without loss of time, declared A. N. Darlington of the highway commission recently. Under the California system of permanent roads, with concrete base, highways are provided over which heavy trucks can be operated without damage to the roads, providing the driver uses the proper precautions of seeing that his tires are in good condition. There will be no need for a sprague on the grades we are providing. He says:

"Throughout the Sacramento and San Joaquin Valleys, and in Southern California, too, the state roads have brought about a great increase in the number of motor trucks in operation, and when the boulevard system is completed there will be many more in use in long distance trucking.

"The Ridge Route between Los Angeles and Bakersfield has provided an easy route for motor trucks, and as soon as the paving of this route is completed and the approach in the Castaic Canyon made permanent there will be a great deal of trucking between Los Angeles and the oil fields of Kern county."

## Enclosed Cars the Year Around

Among those who keep their fingers upon the pulse-beat of the automobile selling market it has been observed that a very decided swing toward the inclosed car for year-round service has manifested itself.

Motorcar buyers now realize that the inclosed car is the really practical car for all-year use. Consider the 1916 electric models. On summer days their ventilation is so perfect that the passengers enjoy touring-car coolness, while as soon as the cold and disagreeable days of late fall, winter and early spring arrive the owner is afforded limousine luxury and comfort without a change of body or extra cost.

Furthermore, of course, there is the supreme silence and smoothness of the electric-powered inclosed car which is a distinct advantage in its favor. The motorcar public is beginning to consider the modern electric in its true light—as a big, powerful, reliable automobile and not merely a beautiful equipage for woman's use.

## Giant Tires for Service Truck

Speaking of the giants in pneumatic form which the Goodyear Tire & Rubber Company builds for service on trucks where additional cushioning is required—for instance, in transporting furniture, groceries, produce, hardware, and other products which are subject to breakage or deterioration when jolted, R. S. Wilson, manager service tire department, states that letters are being received every day from all sections of the country containing expressions of satisfaction that both the product and the selling plan are right.

"These big pneumatics, which range in size from 36x6 to 42x9," says Mr. Wilson, "have been put to the most rigorous tests and everywhere have emerged triumphant. We are the pioneers in introducing a big pneumatic tire for automobile trucks and have necessarily had to blaze our own way and the way for others. At first real selling effort was required to introduce them, but now that they have vindicated themselves, their sale has been greatly accelerated. Their field is rapidly developing. Nearly every truck manufacturer in the country will now honor specifications for our big pneumatics."

## Fire Apparatus in Prospect

A petition asking city council for the purchase of a new hook and ladder truck to take the place of the present apparatus, signed by a number of property owners, and also indorsed by the board of directors of the Retail Merchants' Association at Alexandria, Virginia, was presented to the city council and referred to the joint committee on fire and finance. Councilman Brockett offered a resolution that the fire committee learn the cost of a new truck and the kind needed and report as soon as possible.

Councilman Harrison said an aerial truck would cost from $9,000 to $10,000. Mr. Brockett asked for a report at the next meeting on the old recommendations of the fire committee on the question. He suggested platforms at certain points along the river front for the new motor engines and pipes to draw the water, in the event of a low tide.

Councilman Desmond told the council that the members of the fire committee of council expect to go to Annapolis and witness the test of a truck, adding that if weather conditions are favorable the truck will be brought to Alexandria and given an exhibition test for two days.

## Greater Speed for R. & L.

Of all the problems confronting the electric car manufacturer, that of speed was hardest to solve. Since electrics became popular conveyances many people have had the impression that speed could not be made a distinguishing feature of an electric car. Yet as far back as ten years ago electric cars were driven faster than a mile in fifty-eight seconds. The new Rauch & Lang models of the Baker Rauch & Lang product have redesigned motors which give greater speed, it is claimed, than has heretofore been possible for general use. This speed means that the electric car may be driven twenty-seven miles an hour, which is much faster than the traffic regulation of any city will allow. This new motor also makes hill climbing at a faster rate possible.

## Detroit Electrics Have New Branch

A distributing branch of the Detroit electrics has been established in Milwaukee by the Anderson Electric Car Company. It is located at 604 Downer avenue and is under the management of Jean A. Crandall, who has been connected with the distribution of electric cars for the last nine years. Mr. Crandall comes to Milwaukee from Chicago, where he had been connected with the Anderson company's branch.

# Union Transfer Company's Delivery System

*Electric Delivery in Washington D. C. Proves Its Economy*

BY CHARLES A. BOTHELL

*This paper, read before the Washington Section of the Electric Vehicle Association of America February 10, describes conditions which, while applying specifically to the city of Washington, D. C., are nevertheless of interest in all parts of the country. Attention is called particularly to the service records quoted by the author which prove the superior efficiency of the electric truck not only to horse delivery but to the gasoline truck as well, even in work for which the gas truck is generally regarded as more suitable. Papers of this kind form a valuable part of the ever-increasing mass of evidence in favor of the electric.*

A BRIEF outline of the experience of the Union Transfer Company with electric trucks will show our reasons for replacing horse equipment with motor vehicles, with some particular reference to our recently installed plant for charging vehicles by the constant potential system. I feel that any presentation of the subject I may be able to make must necessarily be incomplete and more or less unsatisfactory because it is only by a careful study of many long and detailed statements of comparative figures that one can obtain any fair understanding of the economical reasons underlying the replacement of horse equipment by modern motor driven vehicles.

Although my company had for a number of years given some slight consideration to the subject of motor vehicles it was not until the year 1910 that the matter received any serious consideration. Immediately upon the fact becoming known that there was a prospect that the Union Transfer Company would experiment with motor equipment we were deluged with literature and calls from salesmen each representing the best motor vehicle on the market. This large amount of information merely served to confuse us. Consequently, inquiries were made among a number of concerns which had in service various makes of motor vehicles but it was found that practically none of them had arrived at any definite conclusion as to the relative merits of various types of vehicles and none of them with a transportation problem similar to our own could furnish any data for comparison with the cost of operating horse equipment. It was therefore decided to conduct some experiments of our own in the Philadelphia division. The first experiment undertaken by the company was the installation of one 2 or 3-ton electric truck, and a 2-ton gasoline truck to replace large double teams used in through transfer service between depots and the outlying territories. This experiment was conducted for the dual purpose of determining the efficiency of motor transportation and the relative merits of gasoline and electric vehicles. The electric truck has been in service almost continuously since its purchase in October 1910, giving entire satisfaction and has shown an average economy of more than 20 per cent as compared with the expense of operating the horse equipment which it replaced. The original gasoline truck was entirely unsatisfactory in operation and it was very soon disposed of and replaced by a gasoline truck of a different type. This second gasoline truck was fairly satisfactory from the standpoint of service but it was found that the cost of operating effected an economy of approximately only 10 per cent as compared with the cost of operating the equivalent horse equipment and further while its carrying capacity was 20 per cent less than the electric truck the expense of operating was approximately 12 per cent greater. At the end of the second year this gasoline truck met with an accident which rendered it useless and, consequently, it was replaced by a third gasoline truck of still another type and of the same carrying capacity as the electric truck. At the close of December 1915, this gasoline truck had been in service two years and five months and had covered 28,355 miles at an average expense of 13.8c per mile exclusive of depreciation and interest on the investment. At the same date the electric truck had been in service five years and two months covering 48,775 miles at an average expense of 14c per mile exclusive of depreciation and interest upon the investment. Depreciating the gasoline truck on the basis of five years and the electric truck on the basis of ten years useful life and allowing interest upon the investment in each case at 6 per cent the average expense per mile for operation of the gasoline truck would be 20.7 cents and of the electric truck 18.1 cents per mile, showing a difference of approximately 14 per cent in favor of the electric truck. We feel it is perfectly fair in view of the present condition of the two trucks to use the five years basis for the electric truck. It will be noted that the difference in the expense of operation between these two trucks is not as great as is ordinarily expected, but I would call your attention to the fact that the electric truck has been in service on a long distance route averaging approximately 14 miles per trip with but one stop under which conditions an electric truck undoubtedly operates at its least economy as compared with a gasoline truck. Notwithstanding this fact, however, the expense of operation was, as stated above, approximately 14 per cent less than the operation of the gasoline truck in similar service.

As previously stated, however, these experiments were conducted in the through transfer department of the service which represents only a small portion of the entire business of the company. The major portion of the company's business consists of baggage delivery and collection service in which units of smaller carrying capacity are required. Consequently, as the results of the experiments with large equipment indicated, within its limitations the electric truck could be operated cheaper than the gasoline truck. The next experiment undertaken was with two electric trucks of 3,000 lb. capacity to determine the efficiency and economy of motor equipment in the replacement of ordinary delivery wagons. These two trucks were placed in service in territories where light double wagons had been in use and they demonstrated such a favorable saving in operating expenses that in the spring of 1912 six additional trucks of smaller capacity were purchased and it was decided to assign two of them to the Washington division where only wagons had previously been operated. Washington was selected for this experiment because of the fact that the conditions existing in this city for the operation of trucks was considered the most ideal of any city in which the company was engaged in business. The result of the ex-

periment demonstrated that the truck could be operated in Washington at a saving of approximately 15 per cent as compared with the operation of a similar truck in service in the city of Philadelphia. But due to the fact that only single horse units were replaced the percentage of economy as compared with horse equipment was considerably smaller in this city being only about 10 per cent. Even this, however, represented a fair decrease in the operating expense, and consequently, during the next two years ten additional trucks were installed leaving only nine horses in service which had been retained for a number of minor reasons not relating to the comparative expense of operating motor equipment and horse vehicles.

As a matter of comparison between gasoline and electric trucks in regular delivery service where frequent stops are required I desire to call your attention to the fact that on May 1, 1913, in order to cover a rather extended route in Atlantic City, N. J., where the conditions are almost as favorable as those existing in Washington, we installed a gasoline truck of the same carrying capacity as the trucks in use in Washington. This truck at the close of December 1915, had covered 35,596 miles at an average expense of 9.4 cents per mile exclusive of depreciation and interest upon the investment; whereas four electric trucks in Washington service exclusively from three to four years during which time they covered 220,529 miles operated at an average expense of 8 cents per mile exclusive of depreciation and interest upon the investment, a saving of 16 per cent as compared with the gasoline truck. Depreciating the gasoline truck upon a basis of five years and the electric truck upon a basis of ten years there is a difference of more than 44 per cent in favor of the electric truck in the average expense per mile. In the presentation of comparative expense between electric and gasoline trucks no wages have been included.

In view of the fact that my company is engaged in a business where we have nothing to sell but the service of our equipment it can be readily understood that in order to produce profits it is absolutely necessary that we operate our equipment at the lowest possible expense consistent with proper service to our patrons and inasmuch as the tests so far made indicate that electric trucks, where they can be used, are more economical than gasoline trucks it is natural that we should be favorably disposed toward that type of equipment in replacing horse drawn vehicles.

The request that I make some reference to the installation by our company of a constant potential charging system makes it necessary for me to refer back to our earlier experiences in the operation of electric vehicles. When our first two trucks of the small capacity were installed in the regular delivery and collection service it was found that in order to prove economical they must do the work of three wagons but after a few days' test it was found that the battery capacity was insufficient to accomplish this result. This difficulty, however, was overcome by the purchase of an extra battery, making three batteries for the two trucks, and a schedule was adopted whereby a fresh battery was supplied to one truck about 11.00 a. m. each day; the partly exhausted battery being placed on charge until the latter part of the afternoon when it was placed in the other truck. In this manner it was found possible to keep both trucks in service from 6.30 a. m. until 10 p. m. each day. While this system accomplished the desired object insofar as it concerned increasing the mileage capacity of the trucks it also greatly increased the cost of repairs to batteries and produced rapid deterioration of the plates because of the constant handling of the batteries in and out of the trucks. In addition there was considerable time wasted in sending the trucks to the garage for the purpose of charging batteries. The only alternative appeared to be to send the trucks to the garage for recharging or boosting between trips but as the rates at which batteries could be charged were very low the loss of time under such a plan would have entirely ruined any possibility of economy as compared with horse drawn vehicles or gasoline trucks. Consequently, the battery charging system was adopted and has been adhered to throughout the development of our truck equipment. In 1914, however, our attention was called to the advantages of constant potential system of charging by which batteries might be recharged at very high rates without injury. I presume that all present are more or less familiar with this system of charging but nevertheless I quote from a handbook of the battery company briefly outlining the principles:

> This system is based upon the fact that a battery will take efficiently and without injury charging current which will not cause gassing or heating. This means that a battery in a discharged condition can absorb current at a very high rate.
>
> Under this system for the daily or regular charge, the voltage of the charging source is fixed at about 2.3 volts per cell of battery. The voltage of the line is usually higher than this and in such cases counter EMF cells can be placed in series with the battery. Each counter cell is usually figured at about 3 volts.
>
> Batteries in any state of discharge can be put on charge with the voltage properly adjusted as above, and will automatically receive their charge without further attention. A fully discharged battery will take a very high current (about five times the usual "starting" charge rate) at first but this will taper off as the charge progresses and will finish considerably below the usual "finishing" rate. The charge will be complete in a shorter time than under the old method, and the cells will not reach the gassing point, and will therefore not be inured by being left on charge longer than necessary.

I might state that our trucks average from four to six trips per day and stand from twenty to thirty-five minutes at the loading platform between trips, and after studying the new system of charging we recognize the fact that if it were possible to use this standing time for boosting we could possibly eliminate the charging of batteries. The difficulty in this respect was the fact that the garage was located at a considerable distance from the loading platform. However, in installing the additional trucks in the summer of 1915 a constant potential system of charging was installed at the garage and by taking advantage of the lunch periods for boosting without changing the batteries the amount of battery changing was considerably reduced. Recently it became possible for us to obtain current and install a similar charging system at our loading platform, and without going into further detail I desire to present the actual performance of one of our trucks on January 31, 1916, without any change of battery.

This truck left the loading platform at 7 a. m. with a fully charged battery of a capacity of approximately 160 ampere-hours and returned at 9:25 a. m. having covered 11 miles and consumed 35 ampere-hours, remaining at the platform thirty-five minutes during which time 30 ampere-hours were returned to the battery. The truck left at 10 a. m. for its second trip covering 10 miles and consuming 40 ampere-hours and returned at 11:45 a. m., when it was placed on charge during the driver's lunch period and 35 apmere-hours returned to the battery. Leaving again at 1 p. m. the truck covered 11 miles, con-

sumed 45 ampere-hours and returned to the platform at 3:10 p. m., and there being no occasion to dispatch it again until 4 p. m. the battery was placed on charge and received 40 ampere-hours during the intermission. On its fourth trip, leaving at 4 p. m., the truck covered 9 miles with a consumption of 35 ampere-hours and returned at 5:35 p. m. It will be noted at this point that the truck had covered 41 miles and had consumed 155 ampere-hours, and if no means of boosting had been available during the day the battery would have been practically exhausted and the truck of no further use without a change of batteries. It was, however, turned over to another driver at 6 p. m., who made a short trip of two miles and returned at 6:25 and during his supper period from 6:25 p. m. until 7:30 p. m. the battery received a further charge of 37 ampere-hours and left at 7:30 p. m., covering 11 miles and consuming 40 ampere-hours and returned at 10:55 p. m., to be placed on charge for the night. Summarizing the foregoing performance, I would call your attention to the fact that this truck covered during the day 54 miles with current consumption of 202 ampere-hours which is approximately 25 per cent more than the full capacity of the battery and the motor reading at the close of the day showed only 60 ampere-hours discharged from the battery, leaving available approximately 100 ampere-hours, or sufficient to drive the truck, without any additional charge, at least 25 miles. We are obtaining similar results from our other trucks in this city and such results I am sure speak for themselves. They clearly demonstrate that in any service where it is possible to place charging equipment directly at the loading platform and the trucks have two or more intervals during the day to stand at the platform for short periods while being loaded and unloaded, under this system the old bug-a-boo of limited mileage has practically disappeared.

## Manufacture of Automobiles

Preliminary statement of the general results of the 1914 census of manufactures for automobile industry issued by Department of Commerce shows that during 1914 there were in the United States 338 establishments manufacturing complete automobiles, their output being 573,114 machines, valued at $465,042,474. Thirty-eight of these establishments were engaged primarily in manufacture of bodies and parts, agricultural implements, and other products, and reported manufacture of complete automobiles as a subsidiary product. In addition there were 12 establishments which manufactured 20 cars, either for experimental purposes or for their own use, upon which no market value could be placed.

At the 1909 census 315 establishments were reported as engaged in manufacture of automobiles either as a primary or as a subsidiary product; and their output was 127,287 machines, valued at $165,099,404. During the five years 1909-1914 there has been an increase of 350.3 per cent in number of automobiles manufactured, and of 181.7 per cent in their total value. That increase in value of output during the five years was much smaller, relatively, than the increase in number is accounted for not only by a general reduction in prices, but also by production of a larger proportion of machines of low-priced makes in later year compared with earlier.

Of total automobiles manufactured during 1914, those operated by gasoline or steam power numbered 568,399, and those operated by electric power 4,715, compared with 123,452 operated by gasoline or steam, and 3,835 by electric power, manufactured in 1909. The increase during the five years in the number of gasoline and steam machines manufactured was thus 360.4 per cent and in the number of electrics, 22.9 per cent.

Touring cars formed the principal type manufactured during both census years. In 1914 output of this class of machines was 454,876, valued at $351,585,518, compared with 76,189, valued at $113,510,575 in 1909.

Comparative summary of number of automobiles manufactured as reported for the censuses of 1914 and 1909:

| *Type* | *1914* | *1909* | *% inc.* |
|---|---|---|---|
| Total | 573,114 | 127,287 | 350.3 |
| Gasoline and steam* | 568,399 | 123,452 | 360.4 |
| Family and pleasure | 544,255 | 119,190 | 356.6 |
| Touring cars | 454,876 | 76,189 | 497.0 |
| Delivery wagons and trucks | 22,753 | 2,771 | 721.1 |
| All other | 1,391 | 1,491 | †6.7 |
| Electric | 4,715 | 3,835 | 22.9 |

*Returns were received from only two establishments making steam automobiles in 1914. Statistics for these companies are consolidated with those manufacturing gasoline automobiles in order to avoid disclosure of their operations.
†Decrease.

## Standardization of Motor Trucks

There is a question that is going to arise in the motor truck field before very long, and this question is going to be the standardization of the rating of motor trucks. A prominent figure in truck work has recently called attention to the great variation in the power rating of the models put out by different manufacturers. There should be some attempt to arrive at a standardization for the rating of motor trucks. It might be possible for the National Automobile Chamber of Commerce to take steps to have all models put out by the different manufacturers thoroughly examined and rated at a capacity found consistent with standards to be adopted by such a committee. This would have a tendency which would be considerable to eliminate the policy of some manufacturers who overrate truck capacity in their advertising campaigns.

The great variation in rating, both of the capacity and the power of motor trucks of the American manufacturers, were shown recently in a report made by a New York expert. Capacity rating for trucks exactly alike in specifications oftentimes varies to a ton and sometimes more. The suggestion that a standardization be resorted to nationally will be made to the truck manufacturers who are members of the National Automobile Chamber of Commerce at their next meeting, and it seems quite probable that some action will be taken in this respect.

## Electrics Made Fool-Proof

The control system on the up-to-date electric has been simplified to the greatest extent and provided with every means to assuring the greatest driving safety. Cars cannot be started until the brakes have been released. Brakes cannot be set without shutting off the power. Cars cannot be reversed until they have been stopped. As a rule, two and three different means are provided for stopping the car, while the entire controller apparatus can be locked securely when leaving the car. All late equipment includes the electric signal horn.



*Arthur Williams.*



*P. D. Wagoner.*



*Harvey Robinson.*



*Frank W. Smith.*



*Frank J. Stone.*



*H. H. Rice.*



*Day Baker.*



*W. H. Johnson.*



*A. Jackson Marshall.*

*Some of the Men Identified with the Progress of the E. V. A. of A.*

# Historical Review of the E. V. A. A.

*Secretary A. Jackson Marshall Gives Brief Resume of Association Record*

ON May 6, 1910, Arthur Williams, general commercial manager of the New York Edison Company, invited to his office a number of electric vehicle men and stated that the purpose of the meeting was to discuss the desirability of forming an association, the object of which would be co-operation in an endeavor to help the public to a better understanding of the improved electric.

It was intended at that time that the association be a local organization only. But when the subject came up for discussion at the annual convention of the National Electric Light Association, it was decided that the vehicle association become national in scope with the Electric Vehicle and the Central Station Association of Boston as a local branch, and that provision be made for the formation of branches in other centers of activity.

At a larger meeting, held in Mr. Williams' office on June 8, 1910, it was moved and voted that the Electric Vehicle Association be formed. The incorporation under the laws of New York on August 29, and the charter meeting on September 1st marked the formal launching of the association. At this meeting W. H. Blood, Jr., chairman of the Plan and Scope Committee of the charter members of the Electric Vehicle Association, presented the constitution and by-laws, which were unanimously adopted and signed by the charter members, headed by the four incorporators of the association, as follows:

Arthur Williams, General Inspector, New York Edison Company, New York City.

P. D. Wagoner, General Vehicle Company, Long Island City, N. Y.

W. W. Freeman, Brooklyn Edison Company, Brooklyn, N. Y.

H. C. Cushing, Jr., Publisher, The Central Station, 59 Park Row, New York City.

Harvey Robinson, New York Edison Company.

C. J. Field, president and manager, Electric Omnibus and Truck Company.

Charles Blizard, third vice-president, Electric Storage Battery Company.

A. H. Ackerman, U. S. Light and Heating Company.

W. H. Blood, Jr., insurance expert, Stone & Webster.

Frank W. Smith, secretary United Electric Light and Power Company.

W. P. Hawley, U. S. Light and Heating Company.

Joseph F. Becker, sales manager, United Electric Light and Power Company.

Alva W. Blanchard, the Waverley Company.

Hugo Tollner, Jr., New York Transportation Company.

W. P. Kennedy, construction engineer, Studebaker Bros. Company.

Frank J. Stone, manager Boston office, Electric Storage Battery Company.

John Kelly, Edison Storage Battery Company.

Wm. J. Dowd, Gould Storage Battery Company.

C. H. Mark, Pittsburgh Motor Vehicle Company.

C. L. Morgan, General Vehicle Company.

W. L. Secord, Westchester Lighting Company.

W. D. Jones, Westchester Lighting Company.

George Hayes, Gould Storage Battery Company.

A. G. Brown, Baker Vehicle Company.

Converse D. Marsh, Edison Storage Battery Company.

Louis Ruprecht, General Vehicle Company.

J. S. Kirkpatrick, New York and Queens Electric Light and Power Company.

V. A. Villar, Studebaker Bros. Company.

E. E. Higgins, Anderson Carriage Company.

After the adoption of the Constitution and By-Laws, the names suggested by the Nominating Committee, for the offices of president, vice-president, secretary and treasurer, together with the twelve names to form the Board of Directors, were submitted by the chairman of this committee, Frank J. Stone, and the following were unanimously elected:

President, William H. Blood, Jr., Stone & Webster, Boston, Mass.

Vice-president, Arthur Williams, the New York Edison Company.

Secretary, C. E. Firestone, Columbus Buggy Company, Columbus, O.

Treasurer and assistant secretary, Harvey Robinson, New York Edison Company.

These constituted the board of directors:

H. H. Rice, the Waverley Company, Indianapolis, Ind.

F. W. Smith, United Electric Light and Power Company, New York City.

P. D. Wagoner, General Vehicle Company, Long Island City, N. Y.

Louis Burr, Woods Motor Vehicle Company, Chicago, Ill.

H. C. Cushing, Jr., publisher the *Central Station*, New York City.

Frank L. Dyer, Edison Storage Battery Company, Orange, N. J.

James T. Hutchings, Rochester Railway and Light Company, Rochester, N. Y.

Louis A. Ferguson, Commonwealth Edison Company, Chicago, Ill.

W. W. Freeman, Brooklyn Edison Company, Brooklyn, N. Y.

F. M. Tait, the Dayton Lighting Company, Dayton, Ohio.

Charles Blizard, Electric Storage Battery Company, Philadelphia, Pa.

Hayden Eames, Studebaker Automobile Company, South Bend, Ind.

President-elect W. H. Blood, Jr., in presenting a forcible address to the meeting, in which the purposes of the association were outlined, urged immediate action and co-operation of central station and electric vehicle interests. President-elect Blood also at this time appointed a number of committees among which were the Standardization and General Publicity, the latter committee to originate a scheme of general co-operative advertising, utilizing the very important data collected in this respect by the Electric Storage Battery Company of Philadelphia. This company, a number of months previous, had instituted an energetic campaign to secure a number of subscribers directly interested in the field for general advertising to promote the use and adoption of electric vehicles

generally. The fund secured through the efforts of Charles Blizard of the Electric Storage Battery Company was turned over to the Publicity Committee with the consent of the subscribers to form the nucleus of the Electric Vehicle Association's advertising fund. A campaign for the establishment of more charging stations in and near the large centers throughout the country was suggested.

The first convention of the association was held in the concert hall of Madison Square Garden, New York City, October 18, 1910, being called to order by President Blood. There were present nearly three hundred delegates and representatives from central stations, electric vehicle, storage battery and allied interests, and great enthusiasm was displayed in the much discussed, comprehensive papers program. The very successful first convention adjourned with a vote of thanks to the New York Edison Company for its hospitality and splendid work under the direction of Arthur Williams in making the first meeting such a success.

The membership on October 18, 1910, was about 50. In November, 1910, the New England Section was added.

The second annual convention of the Electric Vehicle Association was held in the Engineering Societies building, New York City, on October 10, 1911, President W. H. Blood, Jr., presiding. In addition to a number of committee reports there were presented nine papers treating with most of the principal phases of the electric vehicle industry. The morning was devoted to the executive session, at which the officers of the association for the ensuing year were elected, and the papers and reports were presented and discussed during the afternoon of the same day.

The 1911 convention was arranged to be held coincident with the annual electrical exposition held in the Grand Central Palace, which opened on October 11 and continued until October 21. The membership at that time was approximately 300. The following officers were elected for the ensuing year:

President, W. H. Blood, Jr., Stone & Webster, Boston, Mass.

Vice-president, Arthur Williams, the New York Edison Company, New York City.

Secretary, C. E. Firestone, Columbus Buggy Company, Columbus, Ohio.

Treasurer and assistant secretary, Harvey Robinson, New York Edison Company, New York City.

The following four directors were elected to fill the vacancies of officers whose terms had automatically expired:

H. H. Rice, the Waverley Company, Indianapolis, Ind.

F. W. Smith, United Electric Light and Power Company, New York City.

P. D. Wagoner, General Vehicle Company, Long Island City, N. Y.

Louis Burr, Woods Motor Vehicle Company, Chicago, Ill.

W. P. Kennedy was elected to take the place of H. C. Cushing, Jr., who resigned in order to give his entire attention to the publication of the official organ of the association.

The third annual convention of the Electric Vehicle Association was held in Boston October 8 and 9, 1912, President W. H. Blood, Jr., presiding. The membership had increased to 335 and during the year the Chicago Section had been added, which materially increased the activities of the association.

In addition to the most inspiring presidential address, there were presented an unusually large number of valuable committee reports and many interesting papers. The Committee on Publicity, in reporting on the extremely successful national co-operative advertising campaign, described the efforts of those who had made the campaign possible by their contributions and advised at length, and with considerable detail, the form of advertising copy employed, the magazines used, showing that the combined advertisements had had a circulation of over 29,858,778, at a cost of a little over $42,000. In addition to this publicity in the advertising sections of the various mediums utilized, there also appeared a series of reading articles, prepared for the most part by the advertising agency, treating with the advantages of electric vehicles, both commercial and passenger. These constructive articles appeared in a large number of periodicals and exerted quite a considerable influence in many directions.

The campaign had been productive of such good results that it was unanimously felt that the educational work should be continued for another year.

The new officers elected were:

President, Arthur Williams, the New York Edison Company, New York City.

Vice-president, Frank W. Smith, United Electric Light and Power Company, New York City.

Secretary, Harvey Robnison, New York Edison Company, New York City.

Treasurer, Day Baker, General Vehicle Company, Boston, Mass.

The new directors were:

W. G. Bee, to fill the unexpired term of F. S. Dyer, resigned.

To be elected for three years:

W. H. Blood, Jr., Stone & Webster, Boston, Mass.

E. S. Mansfield, Edison Illuminating Company of Boston, Mass.

George H. Kelly, Baker Motor Vehicle Company, Cleveland, Ohio.

P. D. Wagoner, General Vehicle Company, Long Island City, N. Y.

The fourth annual convention of the Electric Vehicle Association of America was held in Chicago at Hotel La Salle, October 27 and 28, 1913, President Arthur Williams presiding.

The membership at the time of the fourth annual convention had increased to 429, and during the year the Philadelphia Section had been added, making the sectional representation at this time three, namely New England, Chicago and Philadelphia, indicated in the order of their creation.

President Williams, in his address, gave a resume of the wonderful growth of electric vehicle activities and held out much encouragement for the future. Secretary Robinson's office had very successfully handled a great volume of business which activity had been made possible by the liberality of the New York Edison Company, which contributed the very large amount of clerical work necessary. In fact, the New York Edison Company donated necessary office space, equipment, and other assistance that was invaluable to the association during its formative period.

A large number of comprehensive committee reports presented at this convention were noteworthy, and very considerable attention was paid to the matter of adequate charging facilities, the Rates and Charging Stations Committee presenting an unusually complete report indicating the kilowatt-hour cost of current as supplied by central

stations all over the country on a retail and wholesale basis, also on and off-peak. This report has been of very considerable assistance to the association since that time in compiling similar data. The report also contained a list of charging stations and the number of passenger and commercial vehicles in some 128 towns. Much needed and valuable information on the garage situation was covered by the Garage Committee, and presented in its report.

The Publicity and Advertising Committee reported on accomplishments secured through the operation of the 1913-14 co-operative publicity campaign, to which about $35,000 had been subscribed from 107 contributors, this being an increase of 5 over the first year. It was pointed out that the ratio of contributions to the total divided between the central stations, battery and other accessory manufacturers, and vehicle manufacturers, corresponded very closely to that of the first year, the central station companies contributing 54 per cent, battery and other accessory manufacturers 31 per cent, and vehicle manufacturers 15 per cent.

In connection with this campaign the association distributed two highly artistic and informative booklets, eight by ten inches, containing a considerable amount of specification and historical data. One, "The Story of the Electric Pleasure Vehicle," the other, "The Story of the Electric Commercial Vehicle." These booklets were sent to concerns inquiring as to the result of the publicity contained in the various classes of magazines employed.

On October 28 a luncheon was tendered the delegates at Hotel La Salle by the Commonwealth Edison Company, L. A. Ferguson, vice-president, presiding.

The new officers elected at this convention were:

President, Frank W. Smith, United Electric Light and Power Company, New York City.

Vice-president, John F. Gilchrist, Commonwealth Edison Company, Chicago.

Secretary, Harvey Robinson, New York Edison Company, New York City.

Treasurer, Day Baker, General Vehicle Company, Boston, Mass.

The fifth annual convention of the association was held in Philadelphia, October 19, 20 and 21, 1914, President Frank W. Smith presiding.

The membership was increased during the year from 429 to 885, chiefly due to the untiring efforts of Joseph F. Becker, chairman of the Membership Committee, and his associates. During the year twelve new sections of the association were added to those three previously existing which are indicated in the order in which they were received into the association: Washington, Cincinnati, San Francisco, Los Angeles, Pittsburgh, New York, Detroit, Cleveland, Toronto, Denver and St. Louis.

There were 27 papers and reports, spreading over 525 pages, presented at the convention. It was during President Smith's administration that the present paid secretary, A. Jackson Marshall, was apointed and the permanent office of the association established with headquarters in the Engineering Societies building, 29 West 39th street, New York City. It was this permanent organization of competent assistants which enabled the association to conduct its affairs on a systematized business basis, and considerable attention was paid to securing a large amount of publicity, without cost, in the most prominent and influential newspapers and magazines of all classes in the United States and abroad. This publicity went far to break down and overcome existing prejudice against the electric vehicle and secured for it recognition in the press which heretofore had been almost entirely given over to the gasoline car.

With the unusually large number of sections which were added during the administration, it was possible for considerable attention to be paid to local intensive development work, which materially extended the scope and influence of the association.

The new officers elected were:

President, John F. Gilchrist, Commonwealth Edison Company, Chicago.

Vice-president, W. H. Johnson, Philadelphia Electric Company, Philadelphia, Pa.

Treasurer, H. M. Edwards, New York Edison Company, New York City.

Secretary, A. Jackson Marshall, 29 West 39th street, New York City.

The directors were:

F. W. Smith, United Electric Light and Power Company, New York City.

Charles Blizard, Electric Storage Battery Company, Philadelphia.

E. P. Chalfant, Electric Automobile Manufacturers' Association, Chicago.

James H. McGraw, McGraw Publishing Company, New York City.

The sixth annual convention of the Electric Vehicle Association of America was held in Cleveland, October 18 and 19, 1915, at Hotel Statler, President John F. Gilchrist presiding.

During the year the membership, even in the face of unfavorable business conditions, increased from 885 to 1101, and there were also added two sections, namely, Kansas City, Mo., and Portland, Ore., which brought the sectional representation of the association up to 17 well-organized, local groups, each conducting a local intensive development work.

There was also held coincident with the convention a successful exhibit of electric vehicle appliances, which were effectively displayed in spaces immediately adjacent to the main convention hall.

During the year the publicity work of the association assumed even larger proportions, and with the co-operation of the general office many of the sections conducted local co-operative advertising and publicity campaigns, greatly stimulating electric vehicle progress in different parts of the country.

The reports of committees and papers presented at the convention were all peculiarly timely, and the convention was generally conceded to be a bright spot in the association's history. The work accomplished during the year had evidently found considerable favor among central stations and manufacturers in general, and President Gilchrist and Secretary Marshall were able to present a voluminous paper before the National Electric Light Association Convention in San Francisco in June, which added considerably to electric vehicle prestige in the central station field.

A feature of the Association's sixth annual convention, held in Cleveland, was an inspiring address made by E. W. Lloyd, president of the National Electric Light Association, in which Mr. Lloyd effectively outlined the great breadth and importance of the electrical industry with its many ramifications (see Electric Vehicles, February, 1916, page 69). Mr. Lloyd dwelt on the profitable results that were secured through systematized, coordinated effort, and that even greater returns of mutual interest and benefit could be secured if means were found whereby the Electric Vehicle Association and the Na-

tional Electric Light Association could more closely co-operate than they had in the past. Mr. Lloyd paid a glowing compliment to the splendid achievements of the Electric Vehicle Association during its life of some six years, and pointed out that with the organization work already developed, and the facilities which closer co-operation with the National Electric Light Association would assure, the most important results could be obtained in securing merited recognition by a large number of successful central station organizations throughout the country. Mr. Lloyd's remarks were enthusiastically received and it was suggested to the incoming administration that ways and means be devised of more closely working with the National Electric Light Association.

The new officers elected at this convention for the ensuing year were:

President, W. H. Johnson, Philadelphia Electric Company, Philadelphia, Pa.

Vice-president, E. S. Mansfield, Edison Electric Illuminating Company, of Boston, Mass.

Treasurer, H. M. Edwards, the New York Edison Company, New York City.

Secretary, A. Jackson Marshall, 29 West 39th street, New York City.

The four new directors:

John F. Gilchrist, Commonwealth Edison Company, Chicago, Ill.

W. H. Blood, Jr., Stone & Webster, Boston, Mass.

George H. Kelly, Baker R. & L. Company, Cleveland, Ohio.

P. D. Wagoner, General Vehicle Company, Long Island City, N. Y.

## Electric No Longer Town Car

The belief still clung to by some people that the electric car is primarily a town car has been conclusively refuted by recent performances of Detroit electrics. H. H. Dennis, of Toledo, drove a stock model Detroit electric over storm-roughened winter road from Detroit to Toledo—a distance of seventy-eight miles—on one battery charge.

But a short time prior to Dennis' trip another stock model Detroit electric climbed Mount Lookout, in Colorado. Starting from Denver it climbed to the summit and returned—a distance of forty-six miles up steep mountain trails—without the slightest difficulty. These and many other recent performances amply demonstrated that the modern Detroit electric is a powerful automobile for any town or suburban use.

The trip from Denver to Golden, a steady rise, was made entirely on fourth speed, and it became necessary to employ the fifth speed only when the six-mile drag up the real mountain road began. In many places on the gradient it was possible to drop back in fourth speed.

It was not long ago that a stock model Detroit electric made twenty consecutive daily trips from Detroit to neighboring towns and return. The trips averaging eighty-four miles, and each run was made on a single battery charge. During the course of the runs not a single case of mechanical trouble developed, although the weather and roads were very bad on most of the days.

Probably the mechanical excellence of the modern Detroit electric is the prime factor in the unusual rise in popularity it has undergone in the last several years.

It has become well established in the minds of people all over the country that the Detroit electric is a real automobile in that it possesses sufficient power and strength to negotiate rough country roads and mountain lays as well as smooth city streets. Its speed has been developed until it has all anyone really needs, and more than speed ordinances will permit.

## Electric Trucks Demanded in England

Because more and more men are enlisting for military service each day in England, women are filling many vacancies and performing many tasks which two years ago would have been considered entirely out of the range of feminine possibilities. One of these unusual employments is that of driving automobile trucks, and because electric trucks are lighter, of simpler mechanism and easier to operate, most English truck buyers are purchasing electrically propelled vehicles of but two or three tons capacity to replace the gasoline trucks.

Practically all the trucks used for commercial purposes in England are now driven by women. They are proving themselves efficient and careful drivers, but the constant shifting of gears and the necessity of cranking, the physical force make the operation of heavy gasoline machines a severe tax on their strength, and the electric truck is, therefore, supplanting the gasoline car. In a recent letter addressed to the Electric Vehicle Association of America, an English engineering firm announces that the number of electric machines in use and on order in that country is rapidly increasing.

While the export of gasoline cars from this country to Europe greatly exceeds that of electrics, it is a significant fact, the letter states, that the majority of gasoline machines are sent to the war zone, where they have an average life of two to six months, while the electrics used for commercial purposes in England are becoming a permanent installation.

## Oklahoma City Taxes Electrics

Electric automobiles will no longer escape taxation, City Commissioner Mike Donnelly said recently in announcing that an ordinance regulating the electric vehicles in Oklahoma City will be prepared and probably be passed so that owners can obtain licenses before the beginning of the next fiscal year in April.

As electric cars are not affected by the new state license law, those machines are not paying tax in Oklahoma City now. They will be compelled to pay the former tag tax of $3 per year under the new ordinance, which will be prepared jointly with the proposed ordinance requiring all automobiles in the city to be registered at the office of the city clerk.

The passage of the ordinance will mean that the city is again in control of the machines within its limits. A penalty will be provided for every person living here who takes out a state tag and does not register his name and number with the city authorities.

The corporation counsel of the city of Chicago has informed the city council that the ordinance requiring fenders on motortrucks is invalid. For several months the council has been urging the enforcement of the ordinance, which has been opposed by the Illinois Manufacturers' Association, the Chicago Automobile Association and other organizations.

Editors: EO. J. MOCK, PAUL H. WOODRUFF
Circulation Manager: N. S. STRONGE
CHARLES R. CONOON: New York Representative
New York Office, 1022 Longacre Building
Forty-second St. and Broadway
Telephone Bryant 7030

*This publication is free and independent of all business or house connections or control. No manufacturer or supply dealer, or their stockholders or representatives, have any financial interest in Electric Vehicles or any voice in its management or policy.*

Entered at Chicago Post Office as Second Class Mail Matter

# ELECTRIC VEHICLES

PUBLISHED MONTHLY BY
ELECTRICITY MAGAZINE CORPORATION
Monadnock Building, Chicago
TELEPHONE: HARRISON 3014.

New York Office, 1022 Longacre Building, 42nd Street and Broadway.

Ed. J. Mock and Paul H. Woodruff, Editors

NOTICE TO ADVERTISERS
Changes of advertising copy should reach the office of publication not less than ten days in advance of date of issue. Regular date of issue, first day of each month. New advertisements will be accepted up to within five days of date of issue, but proof of such advertisements cannot be shown in advance of publication.

SUBSCRIPTION PRICE
Per Year $1.50

| | |
|---|---|
| Canada | $1.75 |
| Foreign | 2.00 |
| Single Copy | .15 |

FOR SALE AT ALL NEWS STANDS

NOTICE TO SUBSCRIBERS
REMITTANCES — Remittances should be made by check, New York draft or money order, in favor of ELECTRIC VEHICLES. Foreign subscriptions may be remitted direct by International Postal Money Order.
CHANGE OF ADDRESS—The old address should be given as well as the new, and notice should be received two weeks in advance of the desired change.

If Your News Dealer Will Not Supply You—Please Notify Us

Volume VIII CHICAGO, MARCH 1916 Number 3

## The E. V. A. Becomes a Part of the N. E. L. A.

THE Electric Vehicle Association of America is no longer an association in its own name. It has become a section of the National Electric Light Association, which is one of the strongest trade societies ever organized.

There can be no question that the affiliation is a good one. The National Electric Light Association is an organization of central station interests. The Electric Vehicle Association has always been preponderantly a central station organization. Fifty-eight per cent of its funds were subscribed by its central station members. Its officers and the officers of its sections have generally been central station men. The N. E. L. A. is big enough to handle all the work embraced by the broad designation of electricity in public service.

We do not doubt that the administration of the N. E. L. A. has an adequate sense of the extent and scope of the work carried on by the E. V. A. of A. That body had sections in every important city, and very active and enthusiastic sections they have proven to be. It would be a great mistake to curtail in any degree, in the name of reorganization, the industry and efficiency of these local chapters of the main body. That the E. V. A. is itself now a section should not be allowed to dampen the ardor of its branches, either immediately or by reason of future developments. The electric vehicle interests must see to it that in the affiliation of their society with another it absorbs strength from the abundant vitality of its consolidator and loses none by diffusion.

We must not lose sight of the fact that, from a central station viewpoint, the electric vehicle, while a large consumer of current, is perhaps no larger individually than the electric range, the electric sign, the factory motor and perhaps other applications of public utility current. That the vehicle is a very desirable central station load we know; and we must still keep convinced of that fact the members and sections of the N. E. L. A. whose interests may lie in another direction.

The Electric Vehicle Division of the N. E. L. A. should be permitted to remain as independent of distracting influences and as untrammeled in its propaganda work as it was as a free association. We do not doubt that this present intention will continue through succeeding administrations.

The fact that the central station members always carried the heavy end of the E. V. A. while the electric vehicle manufacturers contributed a comparatively small part to its financial energy, has probably puzzled a good many non-members. There was a dual reason for the condition Some of the manufacturers were automatically rendered apathetic by their distaste for central station domination; neglecting, as is usual in associations, to recognize the fact that it is better to register disapproval by action than by inaction. Those who object to the methods of an association can change those methods by taking possession of the association, by vote and contribution, but they seldom do it. They generally become indifferent and gravitate in the opposite direction.

The central station interests always needed the association more than the car manufacturers needed it. The central stations had other interests; the electric vehicle was only one branch of their business, and they wanted an organization to keep their efforts along that particular line from being scattered by the intrusion of other affairs. The vehicle manufacturers had no other interests; they registered the words "electric vehicle" every time they talked or wrote. Competing strenuously with each other, they balked at contributing to propaganda which they thought, perhaps, benefited others more than themselves.

At any rate, whether the reasons were good or bad, the E. V. A. was a central station function, and is better off as a part of the general central station development campaign which the N. E. L. A. conducts continuously and vigorously.

ELECTRIC VEHICLES, of course, will continue to present the electric car news of the association as it presents all electric vehicle news, whatever the source. We trust the E. V. Section of the N. E. L. A. will be as prolific of good publicity material as the E. V. A. has always been.

## Encouragement in the Price of Gasoline

IF we could consult only our own confidence and enthusiasm we would announce to the world that the only permanent and consistent solution of the gasoline difficulty is the electric vehicle. The trade being already imbued with that sentiment, and this being a trade paper, argument along that line is unnecessary. The thing is to make the public see it as we do.

There is more than one contributory cause for the high price of gasoline. The demands of Europe may be the most important one; but one cannot examine the statistics of gas car registration, now hovering around two and a half million, without realizing the tremendous and unnatural drain on a supply which is, and must continue to be, artificial and a by-product.

The selling price of gas cars has been manipulated down to a point where to want one is to have one, even with the most limited income. The gasoline consumption of the cheapest car is not so very far behind that of the exclusive, high-priced model. The total use of the volatile fluid has reached incredible figures. The industry is built upon a commodity whose supply must by its very nature be limited.

We have well-defined doubts if gasoline ever goes back to its former low prices. There is no question that American ingenuity will solve the problem by devising crude oil engines, semi-Diesels, kerosene carburetors, and the like. That means inevitably a period of trouble, experiment and redesigning. Smoke-belching exhausts and nauseating fumes will rule for a time. The automobile will assert once more the machine-shop parentage that its guardians thought it had lived down.

The gas car at the climax of its success has met with reverse. Misfortune has befallen it—the unwelcome but inevitable visitor who calls sooner or later at every door. Far be it from us to rejoice over disaster; but we must meet our opportunity. The gas car's trouble is the electric's chance.

Figures on the gasoline situation, which tend to bear out our argument that high prices are permanently established, will be found on other pages. Electric vehicle salesmen will do well to arm themselves with these figures as well as with comparative calculations and examples showing the low cost of electricity for charging. Nature and the immutable laws of evolution seem to have provided the electric with a sudden overwhelming advantage, added to those it already possessed. If the industry is so unprepared that it cannot take advantage of the extraordinary opportunity thus created, electrics may as well go out of business.

This is no time to talk of exhausted advertising appropriations. If ever advertising was an investment yielding direct and quick returns, that condition exists now for the electric vehicle.

Only by widespread publicity can the extraordinary opportunity be realized. Car manufacturers who are not prepared for the occasion have little to expect in the future; for no better opening can develop. Now is the time to strike hard and put the electric at least on a par in popularity with the embarrassed gas car.

# Tractor Haulage in Terminals and Warehouses

*G. W. Bully of the Mercury Manufacturing Company Presents His Views*

TO ACCOMPLISH tractor haulage the first consideration is the proper power unit, and from a commercial viewpoint naturally that unit is the one that will do a maximum amount of work at a minimum expense. It is obvious, therefore, that while certain essential elements are requisite in all designs, no one machine could be exactly suited to meet conditions which vary so greatly, and are never exactly alike in any two installations. As all available energy is stored and must be carried on the machine the lowest possible current consumption is of special importance. Small turning radius and compactness is sought because floor space is valuable and working places congested. Other indispensable qualities are extreme simplicity, coupled with reliability and accessibility, for in case of failure of the machine it is seldom that sufficient men are immediately obtainable to do its work.

In general, industrial tractors may be divided into three classes, namely:—

*Industrial*—Intended chiefly for interior work.

*Semi-industrial*—A heavier and larger machine than the industrial tractor, capable of yard, dock and to a limited extent interplant street haulage.

*Semi-tractor*—Which as its name would indicate is only part tractor, as a portion of the load is supported by the haulage unit, bringing it in reality in the truck class. The semi-tractor is seldom found in this line of work—with one exception, described later.

The industrial or carrier truck is in no wise a tractor, although it has been employed as such from time to time without marked success, easily accounted for by the limited motor and battery capacity, and design never intended for such work. The machines in general use are true tractors, varying in capacity from 3 to 15 tons under working conditions, rated by drawbar pull, the maximum generally being quoted.



*Package and Broken Goods on Trailer Trucks Waiting for the Tractor, Chicago R. R. Terminal.*

It is to be regretted that this method of classification, which is the only true rating, is of little value to the prospective purchaser, as he has but scant knowledge of the application of the term to practice. On the other hand, if machines were classified by tons it might well be misleading to the buyer or unfair to the machine, the reason being that drawbar pull required per ton load varies so greatly with working conditions, such as road surfaces, grades, types of carrier, etc., as to require study before a classification in tons capacity as applied to the case can be made. It will be seen that a three-ton machine in one place may rightly be employed as a six-ton machine under more favorable circumstances, the maximum drawbar pull required being about equal in both cases.



*If the Trackless Trains Are Not Over a Thousand Feet Long They Cause the Operator Little Worry.*

## MOTORS AND CONTROL

One of the determining factors of capacity is the motor and, as all industrial tractor manufacturers but one, so far as is known, use but a single size and make but one machine, it is apparent that many cannot be working to the best advantage. To date all too little attention has been paid this important member, as ampere readings taken from different makes of tractors under the same conditions show an astonishing variation in current drawn. Regarding the



*The Tractor Gathering the Trailer Trucks in the Receiving Room.*

motor, this much is certain,—it must have great overload capacity, unusually large commutator area and the shaft should be mounted on ball bearings. The capacity, winding and general design must be worked out to meet requirements.

There is nothing individual about the controllers, as those used in vehicles are largely represented. To them, however, are often attached safety devices which are more or less unique, though they are not a universal feature and are omitted entirely in the semi-industrial type. Some of the more interesting operate as follows:—A strong spring is placed to return the controller handle to neutral and a separate switch is mechanically connected to a foot pedal, which is also attached to the brake applied by a spring when the tractor is not in use. Pressure on this pedal releases the brake and throws in the supplementary switch. The same arrangement is found in other machines, except that the spring returning the controller to neutral is omitted. In another device, the controller is returned to neutral and brakes applied when the operator leaves the seat. This can be noted in the accompanying illustration where the seat is raised at one end by the controller spring. When the operator is in position, the controller is free and a regular foot brake pedal is placed in convenient position for his use. The brakes may be permanently set by means of this pedal.

### METHODS OF DRIVING

In the drive from the motor to the rear wheels there are the three types commonly found in the commercial truck, namely, chain to jack shaft and chains to rear wheels, gear or chain to rear axle driving shaft, which carries a bevel gear, and the single worm gear reduction. The compact manner in which this engineering problem is handled in 39x71 inches over all is clearly seen.

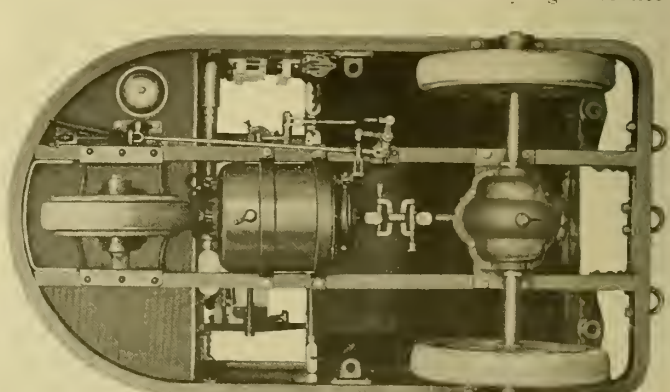
All driving shafts are mounted on high-class ball or roller bearings, which must have unusually large overload capacities, more particularly the thrust bearing back of the worm, which drive is now quite general.

In the smaller types the batteries are spring suspended, but the chassis is not, as it is ordinarily used on good hard smooth floor surfaces. In some cases the battery trays are supported between springs to take the rebound, this being the best practice. The larger machines are spring hung, the intermediate sizes generally having spiral springs and the semi-industrial half elliptic.

### METHODS OF STEERING

In the industrial tractor there are four forms of steering gears, and in the semi-industrial but two. The ordinary automobile drag link connection with two-wheel steer is represented. Unfortunately it is necessary in rounding a curve with a four-wheel machine to turn the inside wheel through a greater angle than the outside wheel. To approximate the correct angle a line is drawn from the pivot point of the steering knuckle to the center of the rear axle. When the wheels are in the straight running position, the drag link will be parallel to the axle, and if connected to the steering arms at the point where the lines drawn intersect the drag link either in front or behind the axle a fair compensation for angle will be obtained. If the wheel base is shortened, however, the angle formed by the steering arm and the drag link becomes more acute, so that with the industrial tractor wheel base it is very noticeable; in fact, is so great that the wheels cannot be turned as far as they should be and again returned to the straight position. The result is that the best possible turning radius cannot be obtained with this arrangement. In order to get the best turning radius a vertical plane on a line drawn through the center of the spindle of the inside front wheel should cut a vertical plane passing through the rear axle center just inside the rear wheel, as in motor cars. By a very simple arrangement of levers this has been accomplished by one concern building industrial and semi-industrial equipments, with the results that the turning radius is equal to that of a three-wheel machine and wheels are more nearly in correct position at all times than when a regular drag link connections is used.

There are two three-wheel tractors on the market, one industrial and one semi-industrial, the first driving on the back wheels and steering with the front only as the Mercury trucks shown. In this case the steering connection is direct. The second drives and steers on the front wheel, the drive being accomplished by a motor located inside of the wheel and the steer by a gear connec-



*Bottom View of a Mercury Tractor Showing Compact Engineering Job accomplished in 39x71-inch Space.*

tion from the driver's seat. The industrial machine of the three-wheel type may be headed straight into a post and, if the front of the machine has ¾ inch clearance, it will turn around without backing and will not strike the post. It is very effective and perhaps the best possible design for inside work.

The four-wheel steer, while giving a fairly short turning radius, has two distinct disadvantages, the first being the mechanical complication of driving and steering with the same wheels; the second, that if the machine is close against and parallel to a wall or other obstruction and is started away from it turning sharply, the rear end heads into the wall instead of away from it. This, of course, is no disadvantage except in confined places, but most working places unfortunately are confined.

### BATTERIES

The usual battery capacities in machines available are 150 ampere-hours at 40 volts, and 225 ampere-hours at 30 and 42 volts. For some time one concern put out a machine having a capacity of but 150 ampere-hours at 24 volts, but it was soon found insufficient. Practice would indicate that for ordinary industrial work 225 ampere-hours at 30 volts is sufficient and that 225 ampere-hours at 42 volts is ample for a ten-hour day. When necessary to operate 20 or 24 hours it is customary to change batteries, which may be done in two minutes time by special arrangement of battery container and slip connections. The semi-industrial machine is generally 60 volt and from 300 to 450 ampere-hours capacity.

The battery to use in this work seems to still be an open question. The general types are plain lead-plate acid battery, the acid battery with the "pencil positive plate" and the alkali nickel-iron cell, each possessing its individual advantages. The acid battery is not so affected by cold, is more efficient and less expensive than the alkali type. It will also permit of a heavy discharge rate when necessary on account of its low internal resistance. The "pencil type positive plate" is more expensive and, while more durable, will probably cost about the same as the plain lead-plate in the long run. The alkali battery is much more durable, requires less care and is lighter than



*"A Snow-Swept Platform Is no Hinderance."*

the acid battery. In all fairness it must be stated that while these cells are affected by cold to a greater extent than the acid cell they are easily protected. There is not a great deal of difference in cost at the end of a number of years service, no matter which cell is used. The cost to the consumer of a certain size of the three types of batteries would be as follows,—$281, $395 and $600. Most users seem to be willing to make the higher initial investment.

Some few machines are yet made with ordinary open wiring, some are wired in loom, and one at least in metal



*Illustrating the Tilting Safety Seat That Automatically Cuts Off Current When Operator Rises.*

conduit filled with asphaltum after the wires are in place, making all of them a unit and obviating any chance of wear due to vibration, and allowing the removal of the wires in a single piece, as they are fastened in place with but two bolts. The outlets are so arranged that no wiring diagram is necessary, and the controller, motor, switch or any other part may be removed or replaced without any likelihood of making improper connections.

The weight of the Mercury tractor with lead battery is 2,220 pounds; Edison battery, 1,850 pounds.

### TRAILERS

The trailer equipment for these machines might well be described as "anything on wheels." When an installation is made it is quite usual to prepare hitches and use the equipment already available, and it is seldom possible to design or have the users purchase new or special trailers.

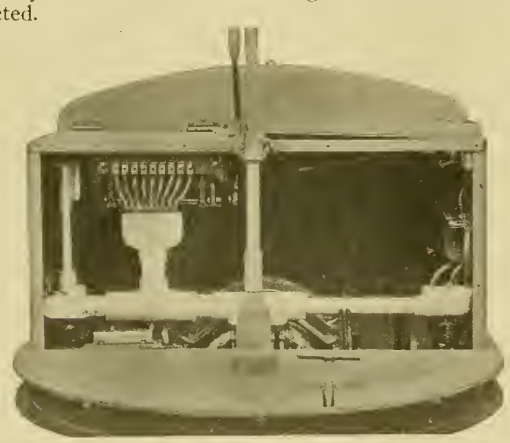
The drawbar pull required to keep a train of usual freight house trucks in motion on a concrete floor may be taken as 65 lbs. to the ton trailer and load. This will be reduced by roller or ball bearings and increased on less favorable surfaces. It is also increased by 17.5 per cent per one per cent of grade, so that a ten per cent grade will necessitate an additional drawbar pull equal to 175 per cent of the original. Only on account of the wonderful flexibility of the tractor trailer method of haulage has this system gained its present position.

Transportation engineers have always realized that placing the load directly on an expensive power unit, with the unavoidable delays at loading and unloading points, did not make for economy or, if a saving was effected, it was but a small portion of that possible. To overcome this, and it has done so to a certain extent, the "lift truck" was devised, when other difficulties arose. Unfortunately the loads became immovable without the carrier, which therefore had to be on hand when required, as quite often machines were being fed and were turning out their work to racks which the carrier picked up and moved. A tractor hauling but a single trailer is therefore more desirable.

TRACTOR OPERATING COSTS

In considering tractor costs and tractor trailer savings, it is natural to compare it with the old-established hand-trucking methods. A few specific cases will answer as illustrations. In these the total cost of operation and maintenance of the small industrial tractor is less than $2 per day, and may therefore be taken as the cost of a single man. In computing tractor cost the depreciation is put at 20 per cent, interest on investment at six per cent, current at three cents per kw-hr., and insurance, renewals and repairs are included generously in this figure.

The first installation is in the basement of a general merchandise concern where the greatest haul is in the neighborhood of 1800 and the average 900 feet. The trailers are six-wheel "empty box" trucks formerly pushed by hand. They are 4 feet wide, 8 feet long and 7 feet high when loaded. It is a daily occurrence to see a train of from 19 to 22 of these trailers, a train 196 feet long, exclusive of tractor, making the several turns, some of them in "S" form. It was originally intended to haul six to eight trailer trains. This machine is now displacing 13 men who were formerly the pushers. It will displace several more, and will also do away with a power conveyor when an incline leading to the street is completed.



*Front Plate Removed Showing Care Taken in Wiring to Assure Permanency.*

Another tractor is handling less than carload freight on three 16 foot platforms about 900 feet long, with a row of posts down the center and bridges across from one platform to the next during loading and unloading periods. The average haul was 880 feet. The machine handled 65 tons per hour, displacing 18 to 20 men, who average but 3.3 tons per working hour each under fair conditions. The power taken for 3.6 days of 10.5 to 11 working hours was 55 kw-hrs., costing the consumer one cent per kw-hr., an average of 13 cents per day.

A record of actual saving on another platform shows a gain of $1,048 per machine per month, which is well toward the purchase price. In each of the cases cited only pushers were eliminated, but quite often labor savings are noted in other directions.

In a certain mill in the middle west, one haul is a good example of the practice of "keeping the material on wheels." The haul of 2,100 feet is broken three times to allow the "material" to go through certain processes before reaching its final destination. The trailer train is loaded directly from a machine, carried 1,000 feet and dropped to be fed to another. The tractor takes the train left on the last trip, returns it 600 feet to the stock room, picks up empty trailers, leaving the loaded train and returning to starting point, where another load is ready, then repeats its trip.

Pushers are, of course, eliminated, but it was previously necessary to employ a good number of laborers to load push carts from stationary racks. The double handling is now avoided, as the racks are on the trailers. The outlay for the system is roughly $30,000; the annual saving more than double this amount.

The semi-industrial tractor cannot always make as good a showing, because horses are often displaced as well as men, but a machine handling ten tons at five miles per hour, capable of working ten hours under full load 70 per cent of the time and costing a trifle over $3.75 per day to operate and maintain, will accomplish much. On a wharf, horses were employed to haul what is termed "low down trucks," which are low-platform flat wagons with small wheels, made in this form for convenience in loading. The load is 2,500 pounds per truck, and was handled by a horse and driver. A tractor here is capable of replacing eight horses and eight men.

It is quite easy for an experienced engineer to tell whether a proposed installation will be practical and a good investment. The comparatively few failures recorded have generally not passed beyond the demonstration period and are directly traceable to the incompetency of salesmen to cope with engineering problems which arise. It is doubtful if the usual salesman has any place in this work, as mechanical knowledge and ability are more or less essential. The ramifications of this field of endeavor are enormous, as it covers the entire industrial world. One day it is a complicated freight platform, involving the entire system of checking as well as handling all sorts of merchandise; then the cellar of a packing house, with its greasy floors, crooked passages and disorder and congestion. The materials of warehouses, railroads, express companies and others too numerous to clasify can, to a great extent, be handled with appreciable saving by this method.

When approached, the man at the head of a concern may recognize the advantages, but quite often will say, "It can't be done," adding that he is very familiar with his conditions. One of the hardest things to combat is the prejudice against change. Another is the natural antagonism of workmen who expect to be ousted and are not inclined to give any machine a fair chance under the circumstances. This is particularly bad during demonstration, as they will resort to anything from shirking to actual damage to the equipment. Not only is the tractor trailer method fast displacing the manual, electric truck and lift truck method, but on account of its great scope is also doing away with conveyors, industrial railroads, and like permanent, expensive and inflexible equipment. It is not in an experimental stage, but has demonstrated itself clearly a useful, valuable servant and has come to stay.

## An Apology

It is with a great deal of pleasure that we place the honor of the authorship of two splendid articles in January issue of the Electric Vehicle Magazine, "Progress of the Electric Passenger Automobile" and "Comparative Operating Data," where it belongs,—to Mr. Gail Reed of the Chicago Electrics. Through some mistake in making up the pages, the title line was left off and Mr. Reed was deprived of his just dues.

# Electric Tractors in Lumber Yards

*A. Jackson Marshall, Secretary Electric Vehicle Association of America, Tells of Splendid Record*

THE metal industries are not the only ones which are reaping commercial benefit from the continuously increasing orders by the countries at war. Demands for lumber have increased by leaps and bounds. and are taxing the capacitties of every mill in the country. A recent report in the *Lumber World* states that the war has caused a tremendous famine of all kinds of wood, it being destroyed day by day on all the fronts in colossal quantities. It is needed for modern warfare almost as badly as metals or cotton. Norway and Sweden (the greatest timber section in northern Europe) are being swept clean as fast as the cutting can be done.

The forests of the United States are, therefore, the great bases of supply, covering one-quarter of the entire country and yielding merchantable timber in quantity and variety far beyond that upon any other area of similar size in the world. We take from our forests yearly about 30,000,000,000 cubic feet of wood, valued at $1,875,000,000. This tremendous industry is carried on by the 29,648 active mills in the country. The reason why these mills are able to show such a remarkable output per year is the modern, up-to-date, efficient method which many of them use in doing business. For example, in just one small section of the yellow pine belt in Louisiana, orders for one week amounted to 4,081 cars, or 80,028,410 feet of lumber. In the past few years the lumber industry in the South has made very rapid strides, Louisiana now being the second greatest lumber producing state in the country.

One of the most modern and best equipped lumber mills in the South is the plant of the Industrial Lumber Company of Elizabeth, La., and the *Traffic World* recently collected some interesting facts concerning its output. This mill has a daily capacity of about 300,000 feet, which means that it must cut approximately 20 acres of land per day. Six large freight engines and 75 flat cars are used to move the logs in from forest to mill. Efficiency is the watchword in this mill from the felling of the trees to the moving of the lumber in the yards by electric tractors or "electric mules," as they are called. This lumber firm found that one of the big items of expense was the trucking facilities for hauling timber about the yard or from the sheds to the freight cars. The moving of this lumber required 20 mules and a corresponding number of men, and it was to displace these that the company decided to purchase an electric tractor. In moving lumber from the mill to the lumber stacks the tractor has a capacity of seven and one-half round trips (2,400 feet each) per hour, towing an average of 1,500 feet of lumber or about three and one-third tons. In this work one tractor replaces five mules and three men.

This big mill has about five miles of tramways, running from the mill to all parts of the different yards. Tramways are from 16 to 20 feet wide and are floored with 3-inch timber. At the mill the tramways are about 20 feet from the ground sloping to about four feet at the opposite end of the yard. The tramway lumber is worth $13 per thousand board feet and costs $5 per hundred for laying. These figures are important, as the mules' shoes necessitated the renewal of this lumber every three years at a cost of $26,650. Obviously rubber tires showed a big saving in this item alone.

After the lumber is dried it is moved from the lumber stacks and dry sheds to the planing machines and then loaded into freight cars located from 60 to 1,000 feet away either by hand or by the tractor. This work is considered very hard on the mules and difficult for the truck, as the hauls are very short and the roads tortuous. The truck has to go between the planers and in other narrow places and into the drying sheds, where it is necessary some times to back down a long narrow aisle. It is in this class of work that the tractor shows the largest saving, due to its flexibility of operation in the smaller spaces and the ability to load and unload quickly. In such work one tractor displaces seven mules and five men, making 13 round trips per hour, with 1,100 feet of lumber per trip. The average distance covered per round trip is 2,000 feet. In transferring lumber from the dry kiln to the dry sheds one tractor will do in two hours work that usually took two mules all day to do.

The Industrial Lumber Company has found that the three electric tractors it is now using have displaced 16 mules and 20 men and are performing the same work with far greater efficiency. In addition the company is effecting an unusually large saving annually by the adoption of "electric mules." It is estimated that the total operating costs for 16 mules, including feed, shoeing, stable help, labor and repairs to tramways, is approximately $22,890 per year. Operating expenses of the three tractors, including renewals of batteries (every year), renewals of tires (every year), renewals of chains, gears, etc., labor and repairs to tramways amount to $9,717. No current has been figured in the operating costs of the three tractors, as the amount used is not considered of any great consequence. Assuming that a mill were to buy current at 4 cents per kilowatt hour the cost would not average over $200 per tractor per year. The total costs per year of mule equipment, including the entire investment, fixed charges and operating costs, are $24,358. For the electric tractors the total costs are $11,115 per year. This shows a saving of $13,243 per year by using electric equipment.

The Electric Vehicle Association of America, which has for some time past been collecting data on the application of electric tractors in this field, has been informed that the Bodcaw Lumber Company of Stamps, Arkansas, has recently given up animal haulage entirely for electric tractor equipment. This mill purchased three electrics about a year ago, displacing 15 mules and 15 drivers. It later found, however, that the same work could be done by two tractors, and used the third tractor to haul finished lumber from the sheds to the cars, which had previously required six mules and six drivers. This makes a total of 21 mules and 21 drivers that are now being supplanted by the three electric tractors and three drivers and a helper. It is estimated that the expense for ownership, upkeep, depreciation, insurance and operation of one of these tractors, when working a little less strenuously than the Bodcaw Mills works its equipment, is approximately $6.00 per day or less; but crowded to its full capacity by performing the work of seven mules, the cost increases to about $7.50 per day as the Bodcaw people figure it. This company stated that there is little or no expense attached to the upkeep of

the machines. It takes about ten minutes each day to oil them, and they are charged at night, which takes about four hours, and as the charging plant is automatically arranged there is no necessity for employing a night mechanic.

While the greater part of the haulage of lumber in this country is done by horses or mules, the limitations of animal haulage have long been understood and the investigations and study which the Electric Vehicle Association has given the matter show that progressive mills are beginning to adopt other forms of transportation. It has been difficult to estimate the cost of animal delivery because there are very few firms that have kept accurate accounts of operating costs. However, it is approximated that the daily mileage of a horse is 15, and a good day's work for a horse is moving 15,000 feet of lumber one mile or its equivalent, such as hauling 5,000 feet three miles. Compare this with the performance of the "electric mule" which is able to tow an average of 1,500 feet of lumber 3½ miles in an hour.

The G. W. Gale Lumber Company of Boston, Mass., has been using five electric lumber tractors for about three years, which are doing much more than the work of 40 horses previously used. The vice-president of this company has a problem that he occasionally propounds to his friends, and it is the result of the work of three electric tractors for 189 days during which time the machines were driven 16,748 miles and carried 9,650,000 feet of lumber that averaged 1.5 pounds to the square foot. He maintains that a horse can transport 15,000 square feet of lumber one mile in a day, and he has asked his friends to determine how many horses would be necessary to accomplish the work of the tractors.

One of the most important features of the storage battery tractor for lumber yard and sawmill service is its absolute freedom from fire hazard. In places where shavings and sawdust would be easily ignited by sparks or hot gases emitted from gasoline machines, the electric can operate with perfect safety.

The ease and simplicity of operation which characterize all types of electrically propelled vehicles is an important factor in the application of the electric tractor to lumber work. Considering the short radius and the narrow aisles in the mill yards in which the tractor must turn, anything which adds to the simplicity of driving the machine is an important consideration. It is common knowledge that an electric, because of its simple rotating motor and absence of all complicated and reciprocating parts, with their attendant wear and tear on the mechanism as a whole, makes its upkeep extremely economical.

## Chescheir New District Manager of Milburn

George M. Chescheir, of Louisville, Kentucky, who for two years has been southern district manager of the Waverley Electric Company, with headquarters at Washington, D. C., has resigned to become district manager of northwestern territory for the Milburn Wagon Company, of Toledo, Ohio. Mr. Chescheir will have his new headquarters at Minneapolis.

The city council of Goshen, Indiana, has voted to buy a $5,000 auto fire truck. The department at Goshen has remained a volunteer affair, with dray or livery horses regularly engaged to be used in cases of emergency to draw the apparatus from their storage places.

## Among the Tire Makers

The B. F. Goodrich Company, Akron, O., is adding three enormous buildings and will make the rubber factory the largest in the world. The largest of the new buildings is a finished goods warehouse, 320 feet long and 280 feet wide, with one wing, which is six stories high, and another of seven stories. The second building in point of size is six stories high, 300 feet long and 100 feet wide. It will be used for manufacturing and storage purposes. The third is a building that will be utilized as a machine and pattern shop. It is five stories high, 260 feet long and 100 feet wide.

The Dayton Rubber Manufacturing Company announces the addition of two of the most prominent eastern tire dealers to their selling organization. One is the Alling Rubber Company, which is well known to the trade throughout the country. This company has been wonderfully successful and now operates a large chain of stores in the east. It is one of the oldest and largest sporting goods and automobile accessory houses in that part of the country.

The Firestone Tire and Rubber Company, Akron, O., now occupies more floor space than the whole company did in 1910, according to the figures given out on the expansion of the plant. The demand for rims for the coming season will be nearly 1,000,000 and this means a large addition to the present rim plant. The company has been increased to give a daily output of 12,500 tires a day this year instead of 7,500, last year's output.

The Braender Rubber and Tire Company, Rutherford, N. J., announces the establishment of three new distributing connections: The Haydock Motor Car Company, Richmond and Cave streets, Cincinnati, O.; Alcorn Rubber Company, 162-164 West Pico street, Los Angeles, Cal.; the American Motor Equipment Company, 181 Massachusetts avenue, Boston, Mass.

Lee Rubber and Tire Company, Conshohocken, Penn., announced that the sales for January of its puncture-proof tire increased 100 per cent over the corresponding month in 1915. Sales of the regular pneumatic increased 70 per cent. The output is now 1,200 tires a day.

The Star Rubber Company, Akron, O., which has been making automobile sundries, is to begin the manufacture of automobile tires. For this purpose a three-story building, 70 by 100 feet, will be put up at a cost of about $30,000.

## Electric Delivery Cheaper

M. Q. White, manager of the D. C. Tiffany Company's electric garage, in Boston, Massachusetts, which has the agency for the Ward Special electric, says statistics carefully compiled prove beyond a doubt that it is more economical to run an electric delivery than to operate a stable. The Ward Special electric, due to its low first cost and high quality, opens a new field for the grocer, baker and laundryman. Specifications, such as Timken axles, Westinghouse motors and controllers, Firestone solid tires, and Philadelphia Diamond Grid battery, assure the buyer uninterrupted service at the lowest possible cost. "We are willing to prove our statement that a single Ward Special electric against a single horse can do the same amount of work for less money, regardless of mileage," says Mr. White.

# Costly Congestion at Terminals

*Antiquated Facilities and Poor Delivery Systems Boost Costs, Remedies Suggested*

BY A. JACKSON MARSHALL

FREIGHT congestion at the terminals and steamship piers of all our large cities and especially New York has become a very knotty problem during the past year and we are hearing a great deal about the chaotic condition into which freight distribution, both domestic and foreign, has fallen. The reason for the unusual congestion of marine terminals just at this time is of course obvious when we consider that approximately 1,000 vessels of which a large proportion were merchant steamers, with an estimated tonnage of 2,000,000 tons have been destroyed directly or indirectly as a result of the European war, while in addition to this are the great numbers of vessels which have been taken for transport service or have been interned.

At the present time over one million tons of freight are stalled at New York terminals, and steamship piers in all of our sea-port cities are stacked to the roof beams with freight intended for distribution. The shortage of ocean tonnage makes it difficult to take care of even the ordinary trade, while the added facilities demanded by bumper crops, the movement of war material and increased exports are greater than present conditions can supply and the result is this great accumulation of freight at marine terminals.

While the shortage of ocean carriers is the major reason for present conditions a great deal of the congestion would be considerably relieved if freight were handled in a more efficient manner at the terminals. Because of old-fashioned methods, antiquated handling facilities and confused schedules, steamers are delayed for long periods. Vessels can be rapidly loaded if cargoes are delivered properly and if they can pass through the terminals with a minimum amount of delay. With the present lack of system and inefficient handling of freight this is utterly impossible.

C. H. Betts, the manager of the Australian department of French, Eddye and Company, regards the shortage of pier facilities and the poor methods of moving freight in terminals as the most serious problem in connection with the commerce of our harbors. The export freight situation has become so serious that some cargoes which should have been moved over two months ago, have not yet been tendered for shipment.

Not only export trade has been affected by the congested condition of our terminals, but domestic transportation suffers as well. Shortage of ocean tonnage is not responsible for the fact that local merchants are unable to get their goods through the terminals. It is estimated that there is a total of 720,000,000 tons of goods every year that passes through the railroad freight and transfer stations of this country and 600,000,000 tons handled at marine terminals making a grand total of 1,320,000,000 tons of freight handled annually in the United States or 4,400,000 tons every working day in the year. The present lack of system in handling this freight and the tremendous amount of lost time involved represents a yearly




*Idleness, Lost Time and Generally Low Efficiency Mark the Congestion of Traffic at Railway Terminals.*

loss of more than $80,000,000 at railway terminals alone. We pay $2,000,000,000 per annum in the United States for freight transportation, four-fifths of which is for terminal work, or about $1,600,000,000.

This is a great economic waste which the public does not yet fully realize and one which has a direct bearing on the much abused "high cost of living," of which an example was the scarcity during the early winter of all lines of California food products. As an aftermath of the conditions resulting from the Galveston storms which crippled the Gulf line steamers last fall, freight congestion at all the marine terminals of the Gulf states was terrific. The unorganized and inefficient methods of handling freight at these piers made it utterly impossible to cope with the unusual congestion. Confusion resulted and shipments of perishable goods were so long delayed that orders had to be countermanded and the demands of the New York market for dried fruit, etc., could not be met. The result was that the retail prices of these commodities went up two and three cents a pound. California shippers have found that due to delay and exhorbitant terminal costs, it is much cheaper to send supplies to interior New England and up-state New York by all rail routes from the coast. The cost of re-handling the freight at the New York terminals makes the expense of sending consignments by the Gulf lines more than the all rate charge.

Railroad officials agree that the present transportation is the heaviest traffic in all railroad history and the peak is not expected for some time to come. The railroad freight now accumulated in warehouses, in the process of loading and in cars banked up on terminal tracks would fill several times over the ocean space in use in export trade. In the entire district of Greater New York there are over 40,000 cars burdened with freight consisting of food and manufactured goods from the West which cannot be moved for lack of transportation facilities. While some of this is export goods which cannot be shipped for lack of ocean carriers, a large percentage is domestic goods intended for our own consumption which is stagnating in the terminal yards because it cannot get through the congested area. The number of New York Central cars alone waiting to be unloaded is in excess of 10,000, while the Pennsylvania Railroad has nearly 12,000 cars stalled on terminal tracks. On the New Jersey Central there are 35 miles of loaded freight cars lined up awaiting discharge.

All of the railroads agree that the great obstacle to movement is the deficiency of terminal accommodations and poor facilities. No railroad can be more efficient than the terminal facilities permit it to be. Railway engineers have conducted and solved the problem of the line haul and by their skill the speed of line haulage has been increased manifold. Freight haulage by rail has reached a high point of perfection embodying both efficiency and economy. But it is only rarely that we find the application of the engineer's skill to an improvement of freight terminals. With a few exceptions freight terminals and their managements remain substantially the same as they were twenty-five years ago. With an eye to the speeding up of line haulage conditions, transportation experts have made the line itself the acme of perfection but they have left the freight terminal with its gross imperfections severely alone. William C. Redfield, secretary of commerce, is quoted as saying:

"Railroad tracks, roadbed, bridges, motive power, cars, signals and in fact all the mechanical and engineering sides of the railway proper, show the impress of the last word of mechanical development. It is only when we go into the railroad freight shed that we go back into the dark ages of industry. There the human worker still reigns supreme, rolling up an annual payroll of millions and congesting traffic by his cumbersome motions. Here freight is moved by the crudest kind of labor and with an apparent absence of any attempt at scientific handling. I am absolutely sure that mechanical appliances can be employed for the greater part of the work. Look about you at the great freight terminals. Where are the moving platforms, the mechanical carriers, and the motor trucks? We have almost wholly failed to apply to the handling of package freight the principles of mechanical transferring with which we are quite familiar in other lines. We complain about our freight rates but nobody seems to worry much about our terminal charges, and yet the terminal charge is as inevitable as the carrying charge, and is by far the largest part of the entire rate. We are today paying freight bills without giving a thought to the fact that a part of the work for which we pay is being done in a highly scientific way, while still a larger part of it is being done by methods which it would be complimentary to call mediaeval."

In comparing the cost of handling freight at railway terminals with the cost of hauling by rail, the following tables developed by the Electric Vehicle Association of America are based on figures given by W. J. Wilgus, late vice-president of the New York Central Railroad. As a concrete example, we will suppose that a manufacturer in Philadelphia sends one ton of freight to a merchant in New York City. From the time the freight leaves the manufacturer the Philadelphia charges are as follows:

| | |
|---|---|
| Labor cost of loading on a wagon | $ .25 |
| Unloading at freight station | .50 |
| Cost to railroad in billing & other clerical work | .40 |
| Actual operating expense of loading and switching freight car, etc | .25 |
| | $1.40 |

The cost of handling in New York is as follows:

| | |
|---|---|
| Terminal costs on New Jersey side of North river (average of all railroads) | $ .15 |
| Lighterage | .80 |
| Terminal cost on water front of Manhattan Island | .50 |
| Cartage expenses in New York City | .80 |
| | $2.25 |

The terminal charges at both ends equal a total of $3.65 on one ton of freight. It costs the railway to haul freight 3 mills per ton mile or for the 90 miles between Philadelphia and New York it costs 27 cents per ton. The cost of getting a ton of freight started on its journey at one end and handling it from the Jersey City terminal to the consignee's store at the other end is nearly 14 times as much as the cost to haul the goods all the way from Philadelphia to New York. To haul a ton of freight 1,000 miles from New York to Chicago costs $3.00 or 65 cents less than the terminal charges at both ends. In other words, it costs more to load a barrel into a car at Chicago and to unload it at New York than it does to move the same barrel between the two cities on the railroad.

The fact that drayage and terminal expenses of freight transportation is 22 per cent more than the line haulage of the same freight over 1,000 miles of railroad is a condition toward which every effort should be exerted to remedy. No one thing alone can solve the problem. In the first place co-operation between rail-

roads, steamship companies, trucking concerns, manufacturers and the public itself is vital. Certain it is that as surely as it is a problem in transportation, improved transportation appliances when once established through the united efforts of everyone interested will work its solution. In the forerank among these appliances stand the commercial vehicle, the electric industrial truck, overhead telpherage systems of freight movement, the gravity conveyor, etc. As the connecting link between the terminal and the merchant, the motor truck must assume the first position.

One case where great improvement has recently been made in the methods of handling freight through the application of the motor truck, is at the piers of the Chicago and South Haven Steamship Company, where the Fruit Belt Auto Truck Express has been inaugurated. A fleet of motor trucks collect shipments of fruit direct from the farmers within a radius of fifteen miles around South Haven, delivering to the steamship pier, where shipments are sorted on the docks according to the consignees and a bulk receipt taken for all the fruit destined for each consignee, very greatly facilitating delivery at the other end. By this method the farmer is saved the inconvenience of hauling to a terminal and in addition has his fruit transferred in the cool of the night so that the produce reaches the market in Chicago early in the morning in good condition. From the point of view of the steamship company this system has two very decided advantages. It opens up new business that they previously were unable to get, and it reduces the overhead expenses of handling business, as the consignments come to them in bulk instead of in smaller quantities from each individual shipper.

The Bush line of Wilmington, Del., which runs freight steamers between Philadelphia and Wilmington, maintains a collection and delivery service, and within the past few months they have added motor trucks to their equipment. The trucks are proving their efficiency on the short haul, for although none of the hauls are over three miles, the trucks are averaging 35 to 40 miles a day as against 12 to 15 miles for a two-horse team. In one sense these trucks are working under ideal conditions, for they are owned and operated by the company which owns the piers, and every possible step is taken to make them as efficient as possible. The space of one side of the wharf is given over to the trucks and the freight is assorted with that in mind. The business houses that are served are saved a great deal of time as the trucks cover a route in less than half the time that horses take. The Bush line finds that on the item of overtime labor alone the cars are affecting a big saving. The trucks get to the pier in the evenings from a half to three-qarters earlier than the horse drawn wagons, which means a great deal as overtime is paid for all dock work after 6 o'clock.

These are two examples where motor trucks have attempted the solution of the congested freight problem. But the piers and railroad freight terminals of most of our great centers create by their congestion a condition which makes it impracticable for the motor truck to step in and even point a possible way to solve the problem. With the congestion at these terminals so bad, motor truck owners are loath to send their trucks there. A motor truck under most conditions is far more economical than horse-driven equipment, but like any other vehicle it is only making money when it is under way with a paying load, and where it is idle for a long time the interest charges on its first cost cut into its earning capacity at a rapid rate. It is not at all infrequent for vehicles to have to wait from three to four hours every working day in the year. With motor trucks this delay causes an actual loss of from $200 to $500 per vehicle per year.

In places where some modern equipment has been installed, such as the electric industrial truck, a more systematic condition has resulted and a considerable economy been effected. In the railway terminals where the electrically propelled baggage truck has supplanted the hand truck, it is estimated that there is a total saving of 66 per cent. Down in Savannah, where the "electric stevedore" has been in use for some time, you may see cotton moved across great piers by these little electric trucks equipped with hoists and cranes, carrying it directly into the holds of the steamers which bring it North. Two of these electric industrial trucks would handle more cotton in one day than twenty freight handlers with hand trucks.

A report of the operation of an electric industrial truck at the Cunard pier, New York City, showed that in handling macaroni boxes, six "electric stevedores" did the work in nine hours that would have required 24 hand trucks. The cost of labor with electric vehicles was $21, while at current longshoremen's rates it would have cost for labor $87.50 if hand trucks had been relied upon. In handling grapes in barrels at the some dock, two industrial trucks did the work of 21 hand trucks. In handling mackerel in barrels, two electric industrial trucks did the work of 19 hand trucks. In handling casks of wine, seven electrics with 13 men did the work of 36 men rolling the casks from one man to another. Under the method of hand truck operation, the cost per ton of handling freight at railroad terminals and steamship piers is 25 cents, while the cost per ton for performing the same work with electric industrial trucks is but 10⅓ cents.

As the use of the "electric stevedore" increases and other modern methods and appliances are installed, it is to be hoped that this will influence a further systematized manner of delivery. As this work becomes more thoroughly unified, freight sheds and docks may find it desirable to operate on a full or partial 24-hour schedule. In cases where the limited ground space available in our city terminals prevents the installation of mechanical carriers that would bring about economy and efficiency, the remedy which appears most feasible to the writer is the establishing of large outer platforms or warehouses where all outbound package freight could be assembled and consolidated, and where the floor movement would be performed by the electric industrial trucks. If the co-ordination of the railroad and highway movement of merchandise and a collaboration of the railroad and teaming interests could be effected, there is every reason to believe that a powerful and efficient trucking organization could be formed which would effect not only an enormous saving over present cost but render greatly improved service through the employment of scientific and efficient methods of operation and a truck despatching system worked out along the same lines as is the train dispatching and car distribution systems of our railroads.

The difficulty of having individual and separate concerns agree to any adjustment whereby to each truck would be allotted a time to call for and deliver freight is apparent, although much could be accomplished with the proper sort of co-operation. It would seem that the alternative is to establish groups of well organized companies which would agree to operate on a scientific schedule of delivering or receiving freight, and would

act as extensions of the railroad and marine systems themselves, or as subsidiaries or companies directly in sympathy with the general problem of transportation and cooperating with the railroad or steamship company in every way possible.

It is estimated that about 40,000 vehicles are constantly engaged in trucking to piers and terminals on the west side of New York City alone. Nearly every merchant sends his trucks to the terminals at about the same hour. The result is a dearth of business between 7 a. m. and 9:30 a. m. at the receiving pier, and a dearth of business between 1 p. m. and 3 p. m. on the shipping platform. Between the hours of 9:30 a. m. and noon on the pier and between 3 p. m. and 4:30 p. m., when the shipping platforms close, both are so busy that long lines of vehicles wait outside each. Some of these vehicles wait for hours before they can get on the piers or up to the platforms. During the afternoon there is practically no business on the shipping platforms. If some systematic schedule were arranged whereby the business could be evenly distributed at both points during all or part of the 24 hours by means of night and day shifts, an annual estimated waste of over $1,000,000 at the New York terminals alone chargeable to delay would be eliminated.

It is not always possible for freight houses to spread over more ground. If we look ahead for a few years and see the volume of freight business tremendously increased, cities built up closely and densely about freight terminals, and the continuous growth of street traffic, we can the more fully realize the necessity of applying good engineering principles to solving the freight transportation problem before it assumes any larger proportions. Railroads and steamship companies are finding it more difficult each year to obtain additional space for yards, freight and passenger terminals, warehouses, etc., and the cost of grounds for these purposes are becoming well-nigh prohibitive. If freight upon arrival were properly handled and delivered, it is likely that the steamship and railroad companies could decrease space now given to receiving and dispatching freight, while the extra area thus obtained could be devoted to a future increase in business proportionately.

A single horse delivery wagon is about 18 feet long and occupies about 90 square feet, while a small motor vehicle of similar capacity occupies scarcely more than 10½ feet in length or 60 square feet, a saving of at least 25 per cent with an extra space for maneuvering allowed. If only half of the vehicles used in trucking on the west side of New York were replaced by motor trucks, the saving to the pier owners of this district alone in increased space available for storage would be close to $300,000 a year.

Night delivery should be an important factor in the proposed plan of operating on a scientific schedule. In the first place it would greatly reduce congestion in the trucking sections of our cities and partially eliminate the present sidewalk obstruction which is a result of the existing custom of dumping freight on sidewalks making it almost impossible for pedestrians or workmen to get through the miscellaneous collections of boxes, barrels, etc. In the case of large wholesale houses for example, goods received at night could be unpacked and displayed when necessary for the next day's business, and the packing department would be free for the day to handle shipments, thus approaching the straight line theory of efficient manufacturing. The possibility of losses by theft or error due to the fact that merchandise at present must pass through several hands in the process of delivery, would be reduced to a minimum by the establishment of a well organized delivery system. A reform of this kind would also materially decrease the cost of transfer from freight terminals to final destination in the city, which as we have pointed out above, means as much or more than the total cost of carrying goods by rail or water over much longer distances.

It is of interest to realize that the railroad and steamship companies in adopting or promoting some such scheme would in all probability use electric trucks as the transportation medium. Since much freight would be conveyed at night either to the big wholesale houses or to well located centers from which points goods could be advantageously distributed the following day, a vehicle operating as noiselessly as possible would be required. Owing to its practically silent operation the electric vehicle would be ideal for traversing city streets at night, since they would not be obtrusive in passing through the residential districts. Furthermore the recognized economy of the electric truck for city use and its absolute dependability are points in its favor for a service of this kind. Electrics are free from the unsanitary and objectionable features attached to horse and gasoline vehicles and it is interesting to note that while gasoline is expensive and the price is still soaring, electricity is constantly becoming cheaper. Moreover there is not associated with the electric the ever present fire hazard of the gasoline propelled machine.

The Electric Vehicle Association of America is indebted in part for some of the data described in this plan to Fred A. Hortter, car accountant of the Boston and Maine Railroad system. If such a plan were adopted and freight were to be thus distributed in a scientific manner, the economies that would be effected in minimizing traffic losses would be almost beyond reckoning. Vehicles that would run at night could operate almost entirely without interruption at a relatively high rate of speed and at a lower cost per ton mile than when constantly bucking congested traffic. Furthermore, goods would be delivered much more rapidly. Freight which would be delivered by day from well located distribution points would suffer much less delay than is now the case in endeavoring to transport freight long distances through almost impassable traffic.

An efficient and well regulated trucking organization would without doubt establish central clearing stations such as have been described, at convenient points in the business districts to which light capacity vehicles could be run from nearby warehouses and from which consolidated loads could be moved in high capacity trucks to the railroad and steamship terminals, bringing back on their return similar heavy loads of inward freight for re-distribution from the central clearing house. Thus there would be secured substantially an extension of the railroad and steamship operation methods beyond the terminals. Warehouse to warehouse delivery is successfully carried on in Europe and from the fact that over 60 per cent of freight haulage in our large cities is done under contract with truckmen, it is evident that the business world in general would welcome an improvement along these lines. Confusion or congestion in freight terminals reacts throughout the entire transportation line using that terminal, hence it is safe to suppose that the solution of terminal freight congestion lies along the lines of improved street transportation by the trucking industries, through consolidation, and through the use of an efficient, modern carrier—the motor truck. But in order to secure maximum efficiency, order must be

brought out of chaos, and the delivering, handling and receiving of freight at terminals must be organized at least as systematically as the railroads and steamship companies handle freight while in transit. The high point of efficiency to which the steamship companies and railroads have developed their systems of line transportation stands out prominently and most favorably when contrasted with the unorganized and disordered conditions at present existing in terminal freight handling. A development of such far reaching influence must sooner or latter attract the best minds—then we can hope for action.

## Birmingham Garage Busy

Birmingham Electric Garage, 2016-18 Avenue B, south, now occupies the building which housed the first garage in Birmingham, Ala.; and to match this, president E. D. Henley enjoys the distinction of maintaining the only exclusive electric service and electric automobile agency in that city.

There are two outstanding features about the Birmingham Electric Garage: It handles the celebrated Detroit Electric, and the well known Willard storage batteries.

Mr. Henley's establishment was one of the first Willard service stations in the south. His place today is completely equipped to give Willard service and accommodation. He can test batteries, recharge them in a trice, rebuild them—do anything to them the Willard factory can render or do for every make of car on the market.

The Detroit Electric, model 59, the latest design, which Mr. Henley is showing, is one of the prettiest closed Detroits ever put upon the market. When madam opens the door to the smart coupe, the steplight and overhead light automatically light up. The glass windows may be moved up or down with a "turn knob." The upholstering is of the finest plush. Beneath the seats are package boxes. A miniature "dresser" in the shape of a leather pouch, attached to one side, is accessible for powder puffs, mirrors and the like. The doors have double catches.

Mr. Henley has been in the automobile and battery business since locomotion by means of gas became the reigning rage. He remembers the first electric car in the city, which appeared there in 1901, to the best of his recollection.

An electric, explains Mr. Henley, will climb any hill mountable by a gas car. "They usually have a speed of about 25 miles an hour, which is enough for the use expected of it. Of course, an electric is not a touring car, but one may charge it up in the morning and run out in the country 25 or 30 miles with 'ease of grace,' as reporters say of a speaker at a banquet.

"When you consider the fact that an electric owner drives the car instead of employing a chauffeur, because it is a great pleasure to drive one, it is really cheaper to own an electric than a gas car. With the present price of gasoline, the hire of a chauffeur, the wear and tear on an automobile which travels here and there, over all sorts of roads, city, country and state, it is a great deal cheaper to maintain an electric than a gas car."

L. E. Lowe, associated with Mr. Henley as head salesman, though young in years, is an "old timer" in the automobile business, especially in the electric end. Although his principal business is selling, he displays his knowledge of electrics and batteries, as well as mechanism of both gas and electric cars, in au extraordinary manner.

There are about 40 electrics in Birmingham, according to Messrs. Henley and Love, who say this is too small a number for a city the size of Birmingham and its wealth. "But we believe more people who can afford them will begin to buy," they say, "for once they ride in one, they will want to ride again. We are glad at all times to take a party out on a trial trip and repeat this as often as they wish."

## Goodyear Truck Tires Popular

"While so many nice things are being said about the progress and prosperity of the automobile industry, some public attention ought also to be directed to the growth and progress of the motor truck industry," declares C. W. Martin, Jr., sales manager motor truck tire department, the Goodyear Tire & Rubber Company, at Nashville, Tenn.

"And there has been progress in truck tires, too. Tires are such a vital element of truck service that their every development is worthy of careful note. In this connection it is interesting to show how Goodyear's S-V truck tire, in less than two years, has taken a leading position. Even we have been pleased and astonished by the mileage records achieved by the comparative tests that accompanied our free offer, and the demand for S-V tires is growing at a rate that has caused careful consideration of our factory production for 1916.

"One of our problems, in backing up the S-V fixed-on tire for trucks was to insure service, for applying these tires, etc. And service meant presses, besides other things. Now, for the great multitude of truck owners who want the pressed-on tire, we have installed presses at all of our branches, and in other cities at strategic points, as well. And we are assured of a phenomenal business. Our position in presenting the S-V tire is simple. We guarantee lowest cost per mile, and we invite comparative tests with any other make of tire on the market, irrespective of shape, height, tread form, etc.

"We have also a tire similar to the S-V in all respects except that it is demountable. We guarantee it, just as we do the S-V, against any other make of demountable tire on the market.

"In the past there have been many efforts by tire manufacturers to do their part of developing the truck industry by evolving a practical sturdy, long-wearing tire, with the other qualities necessary to aid motor trucks to do their work well under a variety of conditions.

"In the S-V we are confident that we have now the nearest perfect truck tire. And our judgment is confirmed by the fine records our tires have made."

## Electric Truck Use Increasing

The first practical gasoline automobile was built about 1886; the first real electric truck fifteen years later. Neither had much of a great demand success until 1909, or, say, seven years ago. It takes time to introduce things so revolutionary.

The great bulk of the electric trucks of the world have been built in the past five years. Each good electric sold eventually sells two more, so production will increase rapidly, once a certain distribution is reached.

## Goodyear Test Ends April 1

"Our offer to refund the entire purchase price if Goodyear S-V tires fail to cost less per mile than competitive makes, will terminate April 1, 1916, at the completion of a full year's test," states C. W. Martin, Jr., manager motor truck tire department, the Goodyear Tire & Rubber Company.

"The wonderful performance of these tires in many gruelling tests has shown graphically that our confidence in them was justified. Of course we know that Goodyear's would win the test, for we had already made about 5,000 comparisons and tests, before we issued our sweeping challenge. But we felt that the time had come to prove conclusively and quickly to motor truck users everywhere, which tire in actual service would excel. Hence the offer—which was as follows:

"'Equip opposite wheels—at the same time—one with a Goodyear S-V, and one with any other standard truck tire of like rated size, bought in the open market. If the S-V fails to cost less per mile than the other, we will return you its full purchase price, making the S-V free.'

"Originally this offer was made to cover three months, but at the expiration of that time many truck owners desiring to take advantage of the offer were unable to do so, as they did not need a replacement of tires during the months specified. So we extended it three months to accommodate them—and have extended it once since. The magnificent response to our challenge on the part of truck owners rendered it such a complete success that we simply couldn't let go.

"But now that the offer has run nearly a year with but five of all the hundreds of S-V's sold having failed to out-wear any other we feel that Goodyear S-V have vindicated themselves and shown their superiority in the motor truck tire world. This five failed—as the best of tires occasionally will—and were subject to full cash rebate under our agreement. Yet their owners did not want the rebate—they asked for new tires.

"That our position was regarded as practically unassailable was impressively evidenced by the absence of any acceptance of our challenge, or of any guarantee of a similar nature by a truck tire manufacturer. The habit has been with others, and at one time with us, to give mileage guarantees on truck tires. But a mileage warrant is simply a guess on average conditions—and it must be low enough to meet bad conditions. So we determined to issue a guarantee of lowest cost per mile under like conditions, against any known make of tire. Goodyear S-V's have emerged triumphantly after a campaign unique in motor truck tire history."

## Advantages of the Electric Car

Visitors at the Louisville, Ky., Auto Show were impressed by the constantly increasing importance electric cars are attaining.

"The rapid and healthy growth of this industry is reflected in ever-increasing numbers of electric cars in service. Comparison of the electric of to-day with that of two years ago will reveal more excellent engineering achievement and refinement than is ordinarily conceded or even appreciated by those not conversant with this growing industry," declares George Bader, president of the Electric Garage Company.

"Car users are analyzing their transportation problems before selecting the type of vehicle best suited for their needs. They are rapidly learning to avoid buying a racehorse when a driving horse is required. The joy riding and the noise, natural attendants upon speed, are being eliminated and test runs are being made for satisfactory transportation, using economy, comfort and safety as the guides. It is often thought that an electric car cannot run fast enough or far enough for successful service. This impression is decidedly erroneous. The present electric will run fast enough with safety and far enough for all city and suburban use.

"Safety, simplicity, comfort and elegance have been the actuating principles of the electric engineers. Desirable engineering refinements have attended the evolution of this car."

## Converted Horse Trucks Damage Roads

In a recent number of the Club Journal published by the Automobile Club of America attention is called to the great damage that narrow steel tired converted horse-drawn trucks which are now used as a sort of trailer to motor vehicles are doing to our highways.

The automobile owner is so frequently charged with destroying the highways that it becomes the duty of all who represent him to point out from time to time exactly who is responsible for any damage.

A period of several months of inspecting the motor delivery systems by which miscellaneous freight is carried from the city into the suburbs and rural districts within a radius of fifty or sixty miles shows a tendency to replace the regular three to five-ton motor trucks with tractors and trailers. These trailers are in most cases simply the old two or three-horse trucks with narrow, steel-tired wheels, that were formerly used on the granite paved city streets. Loads of from four to six tons are now being hauled at a rate of twenty-five miles an hour over the much softer roads outside of the city, the narrow, hard rims cutting into and severely damaging the road surface.

Here is a problem that the state highway departments should take up at once, for this use of the roadway amounts to abuse; it is unreasonable and should be stopped if great harm is not to be done.

Ordinary automobiles and motor trucks, the latter with broad, rubber covered wheels that protect the road surface, are distinguished in the minds of reasonable persons from this newest "road hog."

The legislatures should take speedy measures to penalize those who are now selfishly destroying the roads, for this is the only way in which the rights of the legitimate users of the roads can be preserved.

Mayor Harvey J. Burkhardt and the city councilmen of Batavia, N. Y., were recently in Buffalo inspecting several styles of motor fire trucks, preparatory to purchasing two trucks for the paid fire department which will soon be established in Batavia.

Mayor Burkhart stated after the officials reached Batavia that no action had yet been taken on the purchase of the trucks.

H. M. Dunwody, southern representative of the Anderson Electric Company, Detroit, builders of the Detroit electrics, is in Montgomery, Alabama, to demonstrate and establish an agency there for this make of electric vehicle.

# London Electric Vehicle Committee Meets

*Battery Cars Show Considerable Progress in Great Britain*

BY FRANK AYTON

A MEETING of the Electric Vehicle Committee was held in London on February 18, A. C. Cramb, president of the Incorporated Municipal Electrical Association, presiding in the enforced absence, through indisposition, of the chairman of the committee, R. A. Chattock.

The committee had before it very favorable figures in connection with the increasing circulation of its official publication, *The Electric Vehicle,* subscribers being now numbered in all parts of the world. Owing to his position in connection with the production of munitions in the London area absorbing the whole of his time, Mr. Seabrook has had to relinquish, for the time being, the honorary editorship, the work having been temporarily undertaken by the secretary.

The committee had before it a letter from the secretary of the Electric Vehicle Association of America, reading:

*January 12th, 1916.*

Dear Mr. Ayton:

I acknowledge receipt of your favor of December 29, and, under separate cover, a dozen copies of the December issue of *The Electric Vehicle.*

You and yours are certainly to be most highly congratulated upon the very tangible progress which you have made in the introduction of electric vehicles these past several months. I firmly believe that before long the importance of your splendid promotion work will be very generally recognized, resulting in a tremendous increase in electric vehicle application, and I want you to feel that if there is anything whatsoever that we can do at any time to contribute to your assured success, that you have but to say the word. With my very kindest regards and best of good wishes, I remain, very respectfully yours,

A. J. Marshall, Secretary.

Some little time ago, the committee asked the accumulator manufacturers' section of the British Electrical and Allied Manufacturers' Association, through their representatives on the committee, to consider the possibility of further standardization of lead-acid accumulators for electric vehicles, particlarly in regard to rating and the overall sizes of cells. The committee at this meeting considered a communication from the Accumulator manufacturers' section of the B. E. A. M. Association, stating that it was prepared to agree to the standard sizes and rating as set forth below, which the committee considers satisfactory, and as meeting present requirements. These, as well as the other matters in connection with lead- acid accumulators that have, with the co-operation and assistance of the manufacturers, been standardized, will be known as E. V. C. standards, but it is hoped that, in due course, the British Engineering Standards Committee may give them the mark of approval by adopting them as British standards. Purchasers of electric vehicles, when lead-acid cells are intended to be used, are urged to insist that in rating and construction they shall be in accordance with the E. V. C. standards, which are now as follows:

*E. V. C. Standard Rating.*—This shall be the capacity in ampere-hours obtained by a continuous discharge at a uniform rate for a period of five hours until the voltage of the cell falls to 1.7. *Example:* If a battery is specified to have an "E. V. C." standard rating of 180 ampere-hours, it means that the battery will give this capacity when discharged at a continuous rate of 36 amperes for a period of five hours, at the end of which time the voltage per cell shall not have fallen below 1.7 volts.

*E. V. C. Standard Plates.*—Height, 88⅝ inches; width, 5¾ inches; Lug centers, 4⅜ inches.

*E. V. C. Standard overall sizes.*—For all sizes the width of the cell shall be 6 5/16 inches and the overall height, including connector, 14⅞ inches. The length of the smallest size, i. e. that with 7 plates, shall be 2 7/16 inches with the addition of ⅝ inches for each pair of plates above seven plates.

An exception is in the case of the Chloride Accumulator Company's "Ironclad-Exide" type of cell in connection with which the length of the 7-plate size is 2¾ inches with the addition of ¾ inches for each pair of plates above 7 plates.

*E. V. C. Standard inspection plug.*—Shall be that which will fit a hole in the cover of the cell 1 inch in diameter.

*E. V. C. Standard Charging Voltage.*—Shall be that which is suitable for charging 44 lead-acid cells, i. e. 85 to 120 volts.

The secretary reported that since the meeting on the first of October subscriptions and donations towards the expenses incurred in carrying on the committee's work had been received from municipalities, electric supply companies, manufacturers and others amounting to £56.14.0 ($275.00).

The committee has again undertaken to award money prizes amounting in all to a sum of £10 ($50) at this year's annual parade and inspection of motor vehicles, to be held under the auspices of the Commercial Motor Users' Association, the awards to be to drivers of electric vehicles who obtain the highest marks in written and oral examinations coupled with inspection of their vehicles under running conditions.

The committee has had brought to its notice difficulties which are being experienced in a few of the districts bordering upon the London area by electric delivery vehicles, operating from London on long delivery routes, in getting boosting charges. The difficulties consist in either delay in getting connected up for charging owing to there being no permanent connection for the purpose, or, on the other hand, the exhorbitant price charged for the service. The committee appeals to all central station engineers to adopt, where they have not already done so, the committee's standard tariff of 1d (2 cents) per unit for "off peak" charging, with a minimum of 2s (48 cents) per charge (24 units at 1d) to include all connecting up and disconnecting. By charging exhorbitant prices a central station is not only spoiling any chance there might be of getting the electric vehicle load in its own district, but, in the case of the districts around London, may thereby be the means of preventing a neighboring and progressive central station from getting the fullest possible benefit from the steps it is taking to encourage the use of electric vehicles. It should be clear to all concerned that just as a progressive central station lays the main to get the consumers, so should central stations provide charging facilities ahead in order to obtain the electric vehicle business. At first it is unnecesary to install any expensive motor-generator plant and switchgear; all that is necessary is a permanent (for the time being) connection from the switchboard bus bars through a d.p. switch and fuses, or a maximum overload circuit-breaker, through an adjustable water resistance to a British standard charging plug. If, perchance, there is a booster set or an exciter in the station, giving about 120 volts, that can be used for this purpose when required,

so much the better. The proper and permanent charging plant can be put in when the first car is put into permanent use in the district. And it is not merely sufficient to provide even the makeshift charging connection above mentioned unless the station operating staff are made to show an intelligent interest in the electric vehicle and to offer prompt and willing service whenever a car drops in for a charge.

The committee has been invited by the Society of Motor Manufacturers and Traders to nominate a representative to sit upon the tire research committee which has recently been appointed by the society to investigate all technical matters concerning rubber tires. The Electric Vehicle Committee has accepted this invitation with pleasure.

## Motor Trucks in Snow Removal

Motor trucks played an important part in helping to clear away the recent heavy snowfall from New York streets, although the main reliance of the contractors was on horse-drawn wagons, as in the past. All the motor trucks that were available—between sixty-five and seventy-five—were placed at work on Fifth avenue, and, because of the enormous loads they were able to haul and the quickness with which they could be unloaded and returned, that great artery of traffic was the first of New York's streets to be entirely cleared of snow.

As soon as it was realized that the snowfall was one of the heaviest on record, considering its duration, the contractors, De Marco & Marrone, decided to place the trucks on Fifth avenue in order to take up as little room as possible and thus avoid a congestion of traffic. The idea worked out well, as at no time was the normal flow of traffic held up for more than a few minutes.

Eleven hundred horse-drawn wagons were used on the other main streets and the more important side streets. These were handled by nearly 2,000 employees of the contractors, and the city employed between 6,000 and 7,000 men, in addition. With this force, although it was much smaller than the storm seemed to warrant, a new method of handling the snow was tried, and the result was that for the first time New York went through a bad storm with practically no annoyance.

"Our good fortune in avoiding street railway and traffic hold-ups was due to Commissioner Fetherston's order that the snow be piled in heaps at stated intervals, instead of being shoveled to the curb, as in past years," said Joseph Marrone, one of the contractors. "The piling-up method allowed us to place the motor trucks and teams at the curb and between the piles while loading, out of the way of other traffic.

"Until this time the snow removal vehicles have caused long delays through no fault of the contractors. Apparently this new method has solved the problem, and in future New York can face the worst sort of storm without much worriment."

## Road Conditions Hamper Car Sales

The following open letter from a gasoline car expert contains much of interest to the electric vehicle trade:

Twenty-five hundred and sixty-five out of thirty-four hundred and forty dealers of motorcars and motortrucks throughout the United States state that the condition of the public roads in their territory is from "bad to fair," and the latter only in dry weather.

Nine hundred and six dealers state that the miserable and unreliable road conditions in their territory make the satisfactory and economic use of the motorcar and motortruck impossible from 25 to 50 per cent of the year; five hundred and seventy-four from 50 to 75 per cent, and one hundred and sixty-seven from 75 to 100 per cent.

Eleven hundred and thirty-six dealers believe and state that permanently improved roads in their territory would increase the possibility for sale of motorcar and motortruck from 25 to 50 per cent; six hundred and forty-two from 50 to 75 per cent, and two hundred and sixty-seven from 75 to 100 per cent.

The above statements come from thirty-four hundred and forty legitimate dealers throughout the United States who are attempting to sell your product, our product, or that of some other manufacturer.

Are they not enough to awaken us to the handicap under which we are working and to the fact that less than 10 per cent of our public roads guarantee the economic or dependable use of the motorcar or motortruck?

What greater influence for better road conditions would be possible than the combined efforts of the entire industry and their army of dealers throughout the entire country?

One year ago, the writer of this letter urged upon the motorcar and motortruck industry the importance of entering educational work that would assist in bringing about a better understanding to those who have heretofore been opposing road improvement on account of a lack of knowledge of its value to themselves and their communities.

After about four weeks' deliberation it was decided that for the industry to take up such work through the National Automobile Chamber of Commerce would be a "radical step," and they felt "They could not afford to spend the money in the work," notwithstanding the fact that they had just expended over $5,000,000 in national mediums for advertising the sale of motorcars and motortrucks, and a large portion of the circulation covered by this expenditure went into territories where both the motorcar and motortruck were and are dry-weather vehicles.

While the lack of interest on the part of the industry was discouraging, it made the writer more determined to prove the necessity and value of the work from the standpoint of self-preservation and progress to the industry itself.

The early part of 1915, with the approval of his associates, the writer planned and undertook a national campaign in the interest of good roads, which has not only grown into proportions far beyond our expectations, but has fully demonstrated the eagerness of those who are not receiving it, for reliable information on the subject of goods roads. Tons and tons of good road literature are mailed yearly, but it is not reaching the sources most needing it. The writer has frequently talked with many engaged in good road work, and upon asking the nature of their mailing list, invariably receives the reply, "All the owners of motorcars in the United States." Such a list has little value when it comes to actual results, because it is covering a field that is unnecessary. The very fact that a man owns an automobile today in America with our miserable and unreliable conditions makes him desirous of either wanting to sell his automobile or see a change in road conditions. What we should and must reach are the people in the rural districts, who, as we have already stated, are opposing road improvement because they do not know the value of it. That class of people do not today own automobiles or motortrucks, but they do control the vote upon the road improvement in almost every case, and in 1914 they defeated road improvement bond issues for more than $60,000,000.—S. M. Williams.

Roy Herrington, Detroit electric sub-branch manager at Rockford, where D. E. Whipple, the Chicago manager, decided to go after business hard, a few weeks ago, was in the city conferring with Mr. Whipple.

"Herrington has stirred up a lot of interest in electric cars out in Rockford," said Mr. Whipple. "He has sold seven Detroit electrics in sixty days, a mighty good showing for a city no larger than Rockford."

The question of purchasing a $5,000 motor truck to be used by the fire department will be submitted to a referendum vote at the municipal election at Neenah, Wis., this spring.

# Electric Vehicle Association Developments

*Sectional Development Work, Reports of Committees and New Announcements*

**This department gives the record of all activities of the Electric Vehicle Association of America, in all of its sections, as reported by A. Jackson Marshall, national secretary.**

**Realizing the valuable co-operative development work which the association is doing, the publishers of ELECTRIC VEHICLES offer this exclusive section to association members and all electric vehicle interests in order that they may keep closely in touch with association matters.**

AFFILIATION WITH THE N. E. L. A.

THE most important development since the last review of Electric Vehicle Association activities, and probably the most important incident in the Association's existence, was the recent receipt by the Association of an invitation from the National Electric Light Association for the Electric Vehicle Association to affiliate with it as a section, to be known as the Electric Vehicle Section, a high compliment to the efficacy of the Electric Vehicle Association activities, duly appreciated by the council of the Association.

Probably the best manner of presenting this development is to reproduce a copy of the secretary's formal notice for a special meeting of the entire Association called for Friday, March 10, at 8 o'clock, at the New York headquarters of the Association; the president's letter of explanation, and the proxy, all mailed from the Association headquarters on Saturday, February 26, 1916:

SECRETARY'S NOTICE

At the direction of the Council, and in accordance with Article VIII, Section 2, of the Constitution, a Special Meeting of the Association is hereby called for Friday, March 10, 1916, at 8 o'clock, at the office of the Association, in the Engineering Societies Building, 29 West 39th street, New York City, for the purpose of considering, and the active members voting on, the invitation of the National Electric Light Association that the Electric Vehicle Association of America affiliate with it as a section, to be known as the Electric Vehicle Section, and that when the members of this Association become members of the National Electric Light Association, that this Association be legally dissolved.

PRESIDENT'S EXPLANATORY LETTER

*Subject: Affiliation With the National Electric Light Association*

To the Members of the Electric Vehicle Association of America: At the last annual convention of the Association, E. W. Lloyd, president of the National Electric Light Association, addressed the delegates on the importance of the electrical industry in general and the value of co-operation to all allied interests, and suggested closer relationship between the Electric Vehicle Association, which suggestion was unanimously endorsed by the Convention and referred to the incoming administration.

Committees were thereupon appointed by the respective presidents of the two Associations, which committees, after carefully considering the many features involved, made recommendations to the respective bodies, the result being that at a meeting of the Executive Committee of the National Electric Light Association on January 14, 1916, it was unanimously voted to extend an invitation as per the following letter to this Association to affiliate with the National Electric Light Association as a section to be known as the Electric Vehicle Section:

*January 17, 1916.*

Dear Mr. Johnson:—I am authorized to extend to you as president of the Electric Vehicle Association an invitation to affiliate with the National Electric Light Association as a section.

Our committee appointed to consider this matter recommends that the present contributing manufacturers and central station members of the Electric Vehicle Association arrange to continue paying dues until June 1, 1917, and state that favorable action along this line would be taken.

In the event of favorable action on the part of your board, arrangements could be made for sessions of the Electric Vehicle Association Section at our coming convention, May 22 to 26, in Chicago. No doubt a few good papers could be prepared by that time.

We also expect to have an exhibition and I am reasonably sure that some parking space could be arranged for, either in Grant Park opposite the hotel or some other location near the hotel, for the display and demonstration of some electric vehicles.—E. W. Lloyd, President.

Your council, at a meeting held February 14, 1916, acted favorably on this invitation, and authorized the executive officers to place the matter before the members of this Association, for which purpose the special meeting of Friday, March 10, 1916, at eight o'clock p. m., at the office of the Association, in the Engineering Societies building, 29 West 39th street, New York City, is called.

If the council's recommendation is adopted by the Association, we will become a part of the National Electric Light Association, and thereafter the chairman of the Electric Vehicle Section will always be a member of the Executive Committee of the National Electric Light Association.

As a further result of favorable action, greater facilities will also be offered for exhibitors at conventions, and adequate provisions made for appropriate section meetings.

It is also the belief of your council, and the opinion of those who have carefully studied all phases of the proposed affiliation that such action will not result in a loss of identity, but rather will materially increase the scope and prestige of the electric vehicle and permit the adoption of a broad, constructive policy, made possible through the various channels of Association activities, especially the monthly bulletin, which will devote a definite portion to electric vehicle matters. This bulletin has a circulation of from 15,000 to 20,000 copies and a much larger number of readers.

Owing to the fact that this Association is incorporated under the New York state membership corporations law and that the National Electric Light Association is an unincorporated association, it will be necessary for the members of this Association to separately join the National Electric Light Association and subsequent to the election of all the members of the Association, who are not on the date of the election, as members of the National Electric Light Association, this Association's usefulness will cease, and it should be legally dissolved, and its surplus funds turned over to the Electric Vehicle Section of the National Electric Light Association.

It is earnestly hoped you will be represented at this meeting, otherwise please sign the enclosed proxy and the assent to become a member of the National Electric Light Association, and return the same before March 10, 1916.—W. H. Johnson, President.

PROXY

Know all men by these presents, that I, ....., hereby constitute and appoint Frank W. Smith, of New York City, and A. Jackson Marshall, of New York City, or either of them, to be my lawful attorney, substitute and proxy, for me and in my name to vote at the special meeting of the members of the Electric Vehicle Association of America, called to be held on Friday, March 10, 1916, at eight o'clock in the evening, at its office in the Engineering Societies building, 29 West 39th street, New York City, and at any adjourned meeting thereof, in favor of a resolution that the members of the Association shall accept the

invitation of the National Electric Light Association to become affiliated with it as an Electric Vehicle Section. And, further, to vote in favor of a resolution to legally dissolve the Electric Vehicle Association of America and turn over the funds of said Association in the treasury at the time of said dissolution, less all charges against said fund, to the Electric Vehicle Section of the National Electric Light Association, as fully and with the same effect as I might or could do were I personally present at such meeting or at any adjourned meeting thereof.

In witness whereof, I have hereunto set my hand and seal this .... day of March, 1916. .....

I hereby agree to become a member of the Electric Vehicle Section of the National Electric Light Association upon my election thereto, and I agree to pay all annual dues that may be imposed upon me by said Association, as such member. Said dues in no event to exceed the present schedule of the Electric Vehicle Association of America.

Date March ....., 1916. .....

Little can be added to President Johnson's illuminating letter and the further expressed desire that there will be a full and representative attendance at the March 10 meeting when the subject of such vital importance to the Electric Vehicle Association comes up for action.

NEW YORK SECTION

The February 23 meeting of the New York Section was held in the auditorium of the Consolidated Gas Company, 130 East 15th street, New York City, at 8:15 p. m., D. C. Fenner in the chair.

National Secretary Marshall was called upon and read copies of letters to be issued from the headquarters of the Association on Saturday, February 26, dealing with the possible affiliation with the National Electric Light Association as the Electric Vehicle Section.

Secretary Tobias, in reporting for the Executive Committee, a meeting of which was held in the afternoon, stated that the resignation of S. G. Thompson as vice-chairman of the New York Section, who was formerly connected with the Public Service Electric Company of Newark, N. J., and now identified with the White Motor Car Company of Cleveland, Ohio, had been reluctantly accepted. Mr. Tobias further reported that F. Nelson Carle, advertising manager of the General Vehicle Company, Inc., had been unanimously elected the vice-chairman to fill the vacancy created by Mr. Thompson's resignation.

Joseph L. Tracy, assistant chief engineer of the Electric Storage Battery Company of Philadelphia, was then introduced and gave an unusually excellent review of the characteristics of lead-acid batteries when charging and discharging at high rates. Mr. Tracy's paper was liberally augmented by unique lantern slides, and a demonstration of the ability of the lead-acid battery to discharge at excessively high rates was performed, during which experiment a steel door was melted by the action of the current delivered by the battery. Mr. Tracy's careful and instructive presentation was well received by a large gathering of the New York Section members and their friends.

NEW ENGLAND SECTION

The New England Section held a section meeting on January 27 at Hotel Thorndike in Boston, Chairman Joshua T. Day presiding.

John N. Cole, secretary of the Boston Development Board, gave a talk on the subject of some Boston business embargoes. He especially pointed out how business interests would be served and street congestion be relieved by the motorizing of heavy vehicles in Boston and the entire elimination of horse-drawn vehicles. Mr. Cole's talk was received with much favor and he was given a rising vote of thanks.

It was voted to dispense with the reading of the minutes of the last meeting. F. M. Kimball, chairman of the committee appointed to investigate the conditions governing mail delivery in Boston, made a report of progress which was read by the secretary. This report started considerable discussion, which was participated in by Mr. Jardine of the American Express Company, Messrs. Mansfield, Holden, Hudson and Colonel Hewins.

WESTERN NEW YORK SECTION

The Western New York Section held a meeting on February 14 in the rooms of the Rochester Engineering Society, Chairman Henry J. Schneider presiding. Joseph L. Tracy, assistant chief engineer of the Electric Storage Battery Company, presented "High Horse-Power Operation of Batteries and Electric Vehicles," which was well received and created considerable discussion.

The Western New York Section has already secured speakers for the March and April meetings as follows:

March meeting: "Motor Generator Sets for Battery Charging," by J. F. Lincoln, vice-president of the Lincoln Electric Company, Cleveland, Ohio.

February meeting: "The Latest Developments in Indoor Trucks," by the chief engineer of the Automatic Transportation Company.

Mr. Schneider, the chairman of this section, expects to have speakers for every meeting for the next year.

CHICAGO SECTION

The Chicago Section held an Executive Committee meeting on January 14 at the Men's Grill, Marshall Field Annex, Chairman George B. Foster presiding.

At this meeting the various local committees made reports of their activities, and Gail Reed, chairman of the Garage Committee, reported that one thing the subcommittee on rates was recommending was the matter of having a meter on each car, which would register the total input in kilowatt hours and thus eliminate all possibility of argument between the customer and the garage man over the true amount used. Mr. Foster thought that some capital ought to be made out of the fact that gasoline prices were continually rising. This could take the form of some sort of comparative curves, which could be sent out in a circular letter. Also it might be wise to investigate the extent of petro-mortis, and after careful investigation it might be possible to make some good use of that also.

A regular section meeting was held on January 18 in the Hotel Metropole, Vice-Chairman W. F. Bauer presiding.

Mr. Bauer expressed regrets for Mr. Foster, who had been unable to be present. He presented a letter, which had been sent Mr. Foster from the secretary of the Chicago Section of the American Institute of Electrical Engineers, to the effect that co-operation was desired from us with them for a combined special meeting on the subject of electric vehicles, to be held March 27, 1916. This letter also asked that some action be taken by vote, and if it was agreeable to the majority of E. V. A. members, it was urged that a committee be appointed to meet with the A. I. E. E. committee. Accordingly, Gail Reed moved that the Chicago section, through the chairman, George B. Foster, appoint such a committee to meet with the committee of the A. I. E. E., also that the Chicago Section co-operate in every way possible with this committee. The question when duly seconded was placed and carried unanimously.

Gail Reed, who was to lead the discussion of the day, was introduced and he used his article, "Electric Passen-

ger Cars," which appeared in the January number of the *Electric Journal*, as a basis, reading the more important parts in their entirety. Mr. Reed made the suggestion that a later meeting could be profitably given over to the discussion of the maintenance of data tables, which also accompanied his article.

The February 1 meeting of the Chicago Section was held at the Hotel Metropole, Chairman George B. Foster presiding.

The speaker was W. G. Pancoast, Chicago distributor for the Owen Magnetic Car, now being manufactured by the Baker R. & L. Company, Cleveland, Ohio. As Mr. Pancoast had an early afternoon engagement, he started in very early on the discourse. He furnished each member present with a diagram, showing the conditions which exist from each position of the controlling handle and also showed how it was possible to start and stop the car without change of gears, in other words, without letting loose of the power at any time, as would be the case if it were necessary to shift the gears, as in the ordinary automobile.

A rising vote of thanks was given Mr. Pancoast for his interesting talk and for the trouble he had taken in order to keep his engagement when he was so pressed for time. After a short social discussion, the meeting was adjourned.

The next regular meeting was held on February 8 at the Hotel Metropole, Chairman George B. Foster presiding.

The subject of the day was the lack of the necessary information furnished to electric vehicle owners by vehicle manufacturers and their representatives, and the speaker was O. P. Smith, representative for Chicago and vicinity for the Hertner electric chargers. Mr. Smith said the time is past when we can get by, by telling the customers that all they have to do is to put the car on charge and take it off again when they are again ready to use it. All car companies are more or less guilty in this respect. He did not blame them very much for apparently maintaining such an attitude before the car was actually sold, but he thought that after the sale had been made and the regular deposit secured the customer should at least be told by a competent person of the few essential things about the car which were necessary to know in order for them to be able to operate it or see that it operates efficiently. He said the method employed by him when selling his charging machine was personally to visit each location after the machine had been installed and start the apparatus so as to be sure that everything was operating as it should. At that time he said he usually had to go over nearly the entire car with the customer, as they had apparently been told practically nothing about the various parts of the vehicle. Mr. Smith ended his remarks by maintaining that the vehicle manufacturers were not carrying out their duty in respect to teaching the customer about his purchase, and he hoped that the discussion which followed would produce results in increasing activity in this particular.

Mr. Foster thought that if the sewing machine people could afford to send demonstrators a number of times where the entire value of the deal rarely exceeded seventy or eighty dollars, certainly the vehicle manufacturers ought to find it possible to get a man on the job more to see that things were going right where the value concerned is twenty or thirty times as great.

Mr. Macrae said that he was a crank on instruction and that he fully agreed with Mr. Smith's remarks. He said that what had been puzzling him most from the present state of affairs was, who were to give these instructions, a battery man, a charging apparatus man, car salesman, or car manufacturers' representative, and then again having decided which was the one, what instructions or whose instructions were they to give to the customer? He ended by asking Mr. Smith how he personally handled the question of instruction whenever he was on the job. Mr. Smith replied that he refrained from giving instructions about the other fellows' business as much as possible. He said they had learned from experience as to certain methods by which their machine was making good, and that those were the things he was telling to the customer most.

Taliaferro Milton of the Electric Storage Battery Company said that its men were instructed not to give any information about their make of batteries. He further said that he believed that where there was any matter in doubt about the battery the battery man should always be called in first in preference to anyone from the car manufacturer or dealer.

Mr. Noble of the Lincoln Electric Company remarked that he has found that some car owners are extremely hard to deal with. He thought it would be a great step in advance and produce much good if the battery companies could get together and get up some universal instruction information.

D. M. Simpson, General Lead Batteries Company, thought that whatever we did we should refrain from getting too many men on the job. He has found from experience that it is generally very disconcerting to the customer. The instructions that they give are surely bound to conflict at some point, and while the present complaint may be smoothed up, confliction is bound to be a source of future trouble. He also maintained the manufacturer should take more pains to give better and more essential instructions to the vehicle owner as to the proper operation of the electric vehicle.

Wilton Bentley of the K.-W. Battery Company thought that all instruction books carried certain cardinal points and others which were not so important. His idea was that many instructions which at the present time have more or less stress laid upon them are not so very essential after all and that it would be well to cut down on the volume of instructions, leaving in the more essential points that should be followed for successful operation. He also maintained that the car manufacturer or dealer was the logical one to give these instructions and that they should be provided with general essential battery instructions which would apply in ninety-nine cases out of one hundred, regardless of the make of lead batteries.

D. C. Arlington of the Philadelphia Storage Battery Company agreed with Mr. Bentley's remarks. He further stated that in the case of a private garage he did not like the mercury arc rectifier, as it would not operate below approximately 10 amperes. He said he favored other types of apparatus which could be made to operate down to 5 amperes or less if necessary.

At this point Mr. Noble made the motion that a meeting be called of the interested parties for the purpose of getting together the vehicle manufacturers and dealers, the battery manufacturers, and the battery charging apparatus makers, for the purpose of systematizing and establishing proper and complete instructions for satisfactory and efficient operation of electric vehicles, it being intended that these instructions be agreed to and used by all of the interested parties wherever such instructions were needed to be used by them. The motion was seconded by Mr. Arlington. A discussion followed. Mr.

Foster suggested that it was a case which should be handled by the local standardization committee. Mr. Noble agreed to add this with his motion. Mr. Arlington, a member of that committee, thought it was a capital idea and one which said committee could handle very well. The motion was put and was unanimous, after which, there being no further business, the meeting was adjourned.

Follows a copy of some "Wide-Awake Bulletins" issued by the Chicago Section:

WHAT MAY HAPPEN WHEN BILLS ARE NOT RENDERED PROMPTLY

The value of getting cash for repair jobs, or at least to render bills immediately on delivery of a job, cannot be too strongly emphasized.

A certain dealer did some work on a car and for some reason or other the bill was not rendered promptly. Instead of instantly paying it, and appreciating the extended time, the customer brought in his car with a kick about some trouble that had developed in the meantime. And the dealer had to remedy it—without charge—before the customer paid his bill.

The labor cost was equal to 25 per cent of the bill and the dealer, while conceding the point, felt morally sure that the new trouble must have developed some time after the car had been delivered. His bills now follow the job within 24 hours.

SYSTEMATIZE YOUR BUSINESS

Plan your work and then work your plan, has grown into a business axiom; as such it cannot be gainsaid. This method is applicable—more than that—it is absolutely essential for success, in any business from selling electric cars to selling peanuts. But, unfortunately, not every merchant has come to a full realization of this business axiom. Those that have are making a noteworthy success in the world of commerce and those that have not, slowly but surely are passing on into obscurity.

In line with the above advice, get a card system if you haven't one. Start a good card system for keeping your records. Don't scratch your head and try to keep these things in mind. Write them down. Keep the cards classified for daily, weekly or monthly reference.

Keep a record of every charge—even though it be for only a few cents. Here is an opportunity for you to earn, say, at least a hundred and fifty times fifty cents. Why not record it?

If the Association can be of any service to you at any time, they will be pleased to have you call upon them.

Note: Secretary's office now at Philadelphia Storage Battery Company, 1621 Michigan avenue. Calumet 700.

PUBLICITY

Among the articles released by the general office during the past month are four important ones entitled: "Celebrities and Their Electrics," "Electric Vehicles Used in Coal Delivery Service," "Electric Lumber Tractors Effect Great Saving in Sawmill Service," and "Costly Congestion at Railroad and Marine Terminals, and Unsystematic Urban Delivery."

The last article treats with the important problem of freight transportation and present congested conditions of our freight terminals. The plan for the solution of the freight congestion problem involves the installation of electric tractors as the most efficient means of urban transportation.

COUNCIL MEETING

At the council meeting of the Association held in the committee room, Engineering Societies building, Monday, February 14, 1916, at 3 p. m., there were present Walter H. Johnson, president; E. S. Mansfield, vice-president; H. M. Edwards, treasurer; Frank W. Smith, P. D. Wagoner, James H. McGraw, W. G. Bee, W. P. Kennedy, E. P. Chalfant, D. C. Fenner, George B. Foster, R. L. Lloyd, W. A. Donkin and A. Jackson Marshall, secretary, and by invitation Frank W. Frueauff, Joseph D. Israel and O. H. Caldwell.

The meeting was called to order at 3:15 p. m. The minutes of the last council meeting, held on Friday, November 12, 1915, were approved as presented.

Treasurer Edwards reported a balance of $674.69 on October 1, 1915; receipts of $9,501.69 to February 14, 1916, making a total of $10,176.38. The disbursements from October 1, 1915, to February 14, 1916, amounted to $5,455.28, leaving a balance of $4,721.10. It was regularly moved and seconded that the report be accepted as presented.

The secretary, on behalf of Joseph D. Israel, chairman of the Membership Committee, presented the following membership report:

| | *Active* | | *Associate* | *Auxiliary* | *Press* | *Total* |
|---|---|---|---|---|---|---|
| | *C. S.* | *Mfrs.* | | | | |
| November report | 111 | 32 | 925 | 7 | 28 | 1103 |
| Applications pending | 1 | 0 | 23 | 0 | 0 | 30 |
| | 112 | 32 | 954 | 7 | 28 | 1133 |
| Total members | | 144 | 954 | 7 | 28 | 1133 |
| **NEW ENGLAND SECTION** | | | | | | |
| November report | 33 | 3 | 83 | 0 | 0 | 119 |
| Applications pending | 0 | 0 | 2 | 0 | 0 | 2 |
| | 33 | 3 | 85 | 0 | 0 | 121 |
| Total members | | 36 | 85 | 0 | 0 | 121 |
| **CHICAGO SECTION** | | | | | | |
| November report | 5 | 2 | 134 | 1 | 5 | 147 |
| Transfer | 0 | 0 | 1 | 0 | 0 | 1 |
| | 5 | 2 | 133 | 1 | 5 | 146 |
| Applications pending | 0 | 0 | 7 | 0 | 0 | 7 |
| | 5 | 2 | 140 | 1 | 5 | 153 |
| Total members | | 7 | 140 | 1 | 5 | 153 |
| **PHILADELPHIA SECTION** | | | | | | |
| November report | 2 | 3 | 72 | 2 | 1 | 80 |
| Applications pending | 0 | 0 | 1 | 0 | 0 | 1 |
| | 2 | 3 | 73 | 2 | 1 | 81 |
| Total members | | 5 | 73 | 2 | 1 | 81 |
| **WASHINGTON SECTION** | | | | | | |
| November report | 1 | 0 | 59 | 0 | 0 | 60 |
| Applications pending | 0 | 0 | 4 | 0 | 0 | 4 |
| | 1 | 0 | 63 | 0 | 0 | 64 |
| Total members | | 1 | 63 | 0 | 0 | 64 |
| **CINCINNATI SECTION** | | | | | | |
| November report | 2 | 0 | 18 | 0 | 0 | 20 |
| Transfer | 0 | 0 | 1 | 0 | 0 | 1 |
| | 2 | 0 | 19 | 0 | 0 | 21 |
| Total members | | 2 | 19 | 0 | 0 | 21 |
| **SAN FRANCISCO SECTION** | | | | | | |
| November report | 1 | 0 | 22 | 0 | 1 | 24 |
| Applications pending | 0 | 0 | 1 | 0 | 0 | 1 |
| | 1 | 0 | 23 | 0 | 1 | 25 |
| Total members | | 1 | 23 | 0 | 1 | 25 |
| **LOS ANGELES SECTION** | | | | | | |
| Total members | 5 | 0 | 58 | 0 | 0 | 63 |
| **PITTSBURGH SECTION** | | | | | | |
| November report | 1 | 1 | 31 | 0 | 0 | 32 |
| Transfer | 0 | 0 | 1 | 0 | 0 | 1 |
| | 1 | 1 | 30 | 0 | 0 | 33 |
| Applications pending | 0 | 0 | 1 | 0 | 0 | 1 |
| Total members | | 2 | 31 | 0 | 1 | 34 |
| **NEW YORK SECTION** | | | | | | |
| November report | 8 | 11 | 193 | 2 | 16 | 230 |
| Transfer | 0 | 0 | 1 | 0 | 1 | 0 |
| | 8 | 11 | 194 | 2 | 15 | 0 |
| Applications pending | 0 | 0 | 5 | 0 | 0 | 5 |
| | 8 | 11 | 199 | 2 | 15 | 235 |
| Total members | | 19 | 199 | 2 | 15 | 235 |
| **DETROIT SECTION** | | | | | | |
| Total members | 2 | 2 | 45 | 0 | 0 | 49 |

| | Active C. S. | Mfrs. | Associate | Auxiliary | Press | Total |
|---|---|---|---|---|---|---|
| **CLEVELAND SECTION** | | | | | | |
| November report | 0 | 3 | 24 | 1 | 0 | 28 |
| Applications pending | 0 | 0 | 1 | 0 | 0 | 1 |
| | 0 | 3 | 25 | 1 | 0 | 29 |
| Total members | 0 | 3 | 25 | 1 | 0 | 29 |
| **TORONTO SECTION** | | | | | | |
| Total members | 2 | 0 | 14 | 0 | 1 | 17 |
| **DENVER SECTION** | | | | | | |
| Total members | 1 | 0 | 16 | 0 | 0 | 17 |
| **ST. LOUIS SECTION** | | | | | | |
| November report | 1 | 0 | 27 | 1 | 1 | 30 |
| Transfer | 0 | 0 | 1 | 0 | 0 | 1 |
| | 1 | 0 | 28 | 1 | 1 | 31 |
| Total members | 1 | | 28 | 1 | 1 | 31 |
| **KANSAS CITY SECTION** | | | | | | |
| Total members | 1 | 0 | 14 | 0 | 0 | 15 |
| **PORTLAND SECTION** | | | | | | |
| Total members | 1 | 0 | 17 | 0 | 0 | 18 |
| **WESTERN NEW YORK SECTION** | | | | | | |
| November report | 1 | 0 | 15 | 0 | 0 | 16 |
| Transfer and pending | 0 | 0 | 8 | 0 | 0 | 8 |
| | 1 | 0 | 23 | 0 | 0 | 24 |
| Total members | 1 | | 23 | 0 | 0 | 24 |
| **MEMBERS AT LARGE** | | | | | | |
| *At Home* | | | | | | |
| November report | 41 | 8 | 56 | 0 | 2 | 107 |
| Transfer | 0 | 0 | 1 | 0 | 0 | 1 |
| | 41 | 8 | 55 | 0 | 2 | 106 |
| Applications pending | 0 | 0 | 1 | 0 | 0 | 1 |
| | 41 | 8 | 56 | 0 | 2 | 107 |
| Total members | 49 | | 56 | 0 | 2 | 107 |
| *Abroad* | | | | | | |
| November report | 3 | 0 | 26 | 0 | 0 | 29 |
| Applications pending | 1 | 0 | 0 | 0 | 0 | 1 |
| | 4 | 0 | 26 | 0 | 0 | 30 |
| Total members | 4 | | 26 | 0 | 0 | 30 |

It was regularly moved and seconded that the 19 membership applications be accepted. The secretary reported that resignations had been received from 104 associate members and 23 active members, making a total of 127. It was suggested that in view of the Association's possible affiliation with the National Electric Light Association, no action at this time be taken on these resignations, holding same over until more definite information relative to Association developments could be imparted to those desiring at this time to resign, which suggestion was put in the form of a motion and unanimously adopted.

*Report of the Official Organ and Transactions Committee, P. D. Wagoner, Chairman:*—This committee is postponing further action until definite decision has been reached regarding the proposed affiliation of the Electric Vehicle Association with the National Electric Light Association. If this affiliation should take place, the Vehicle Section of the N. E. L. A. would be in a position to use the *N. E. L. A. Bulletin* and it would then seem to be unnecessary to inaugurate an official bulletin for the Electric Vehicle Association.

*Report of the Legislation Committee, P. D. Wagoner, Chairman:*—Since the submission of this committee's annual report in October last, there has been little opportunity for the enactment of automobile legislation in the different state legislatures holding session this year, as, generally speaking, these bodies have but recently convened.

As far as the committee has been able to determine only a small amount of legislation seriously threatening the motor vehicle is being agitated at the present time, although as the year progresses it is to be expected that the usual number of drastic and objectionable measures will be proposed.

In the annual report above mentioned, reference was made to the fact that in New York City, Mayor Mitchel had appointed a committee to be known as the Mayor's Central Committee on Street Traffic and Safety, the duty of that committee being to act as a clearing house for all suggestions affecting street traffic and safety. Nothing of interest has as yet developed.

On January 1, 1916, a new law became effective in Massachusetts providing that headlights on motor vehicles must not throw light more than 3½ feet above the ground at a distance of 50 feet ahead of the car, and requiring that they must show an object at least 150 feet ahead and illuminate the road for a distance of 10 feet on either side and ahead of the vehicle.

The following quotation from the February 10 issue of *The Automobile* refers further to the Massachusetts situation, which is probably more or less indicative of the situation generally prevailing in the various states:

> There is a measure to make the Highway Commission examine every applicant for a license. Another would make the owner responsible for any damage caused by a chauffeur if the owner were in the car at the time. There are bills requiring the Highway Commission to appoint 500 road monitors; another to have all cars use safety devices on front and rear; one to have all vehicles light lamps half an hour after sunset as motor vehicles are required to do now; a bill to make all transportation companies note the maker's and the motor number of every car they handle to trace stolen machines; others call for bond by owners before allowing to drive, and also for jitneys; for a State motor corps for the militia; for changing the registration fees; to prevent gasoline and kerosene being carried by the same wagon; to prevent contractors spreading tar over the entire width of the highway; to make the Highway Commission grant hearings before revoking a license; to allow motor cars to be operated on the island of Nantucket; to prevent motor cars being driven faster than street cars in the cities and towns; to increase the fees on motor trucks; to establish a motor vehicle commission; to appoint motor patrolmen on the roads; to designate cross walks in cities and towns, etc.
>
> There are other bills that have not yet been printed so that their contents are unknown; the motor representatives have been busy lining up to fight the adverse legislation and it is not expected that there will be any bills enacted that will seriously interfere with the motor industry.

President Johnson presented the communication received from E. W. Lloyd, president of the National Electric Light Association, which is referred to elsewhere in this report.

President Johnson gave an outline of the conditions and investigations leading up to the invitation of the National Electric Light Association and an extensive discussion followed in which the many phases of the matter were reviewed. Upon motion of E. P. Chalfant, seconded by James H. McGraw, it was regularly moved that the council unanimously approve the invitation of the National Electric Light Association for the Electric Vehicle Association to affiliate with it as a section to be known as the Electric Vehicle Section, and the president was empowered to call a special meeting of the Association for Friday, March 10, 1916, at 8 o'clock, when the entire membership would have the opportunity of expressing their pleasure, and the active members, according to the Constitution, voting on the council's recommendations.

It was deemed advisable that the forms of notice for the special meeting of March 10, 1916, the president's explanatory letter to accompany them, and the voting proxies of the active members should be passed on by the Association's counsel, Messrs. Beardsley, Hemmens & Taylor.

*Constitutional Revision Committee, Frank W. Frueauff, Chairman:*—The tentative Constitution and By-Laws to be employed in the event of the Electric Vehicle Association affiliating with the N. E. L. A. as a section, to be known as the Electric Vehicle Section, were referred to Frank W. Frueauff as chairman of the Constitutional Revision Committee with authority to confer with the Association's counsel.

CONVENTION REFUNDS

The following financial statement of the sixth annual convention, held October 18 and 19, 1915, in Cleveland, Ohio, was presented:

| | |
|---|---|
| Received from 35 contributors | $3,585.00 |
| Received for the sale of exhibit space | 380.00 |
| Received from entertainment committee for banquet | 282.50 |
| Received from Chemical Pub. Co. account overpayment | 10.35 |
| Total receipts | $4,257.85 |
| Total convention expense | 3,207.48 |
| Balance | $1,050.37 |

Treasurer Edwards moved that the surplus of $1,050.37 be returned on a prorated basis to the thirty-five contributors, this being equivalent to returning 29.29 per cent of the contributions received. This motion was seconded by Mr. Chalfant and unanimously passed, and the secretary was directed to draw checks accordingly.

The meeting adjourned at 5 p. m.

## Flying Trip Wins Toledo Customer

H. H. Dennis, the Toledo dealer for the Detroit electric car, was doing some heavy worrying just before Christmas, for owing to delays to manufacturing schedules a Detroit electric he had promised to deliver Christmas morning to an expectant customer, could not be finished and ready for shipment from the Detroit factory until December 24.

The several carloads of Detroits which had been unloaded at Toledo by Mr. Dennis were all sold and tagged for delivery on the morning of December 25, so the possibility of filling the order in which he was particularly interested did not look bright.

Mr. Dennis suddenly thought of the many suburban trips made last summer by Detroit electric cars and immediately decided to rush to Detroit and drive the car himself back to Toledo.

Friday morning, December 24, Mr. Dennis left Detroit driving the car and Friday noon he registered in fine shape at one of the Toledo newspaper offices after having traveled the entire distance of seventy-seven and one-half miles on one battery charge—and with power still left to spare. The trip was made against a strong head wind and over roads that were so bad in places that Mr. Dennis preferred to drive the car through bordering corn fields rather than to stain or mar the finish of the car by driving through the splash and mud of the road.

## Electric Leader in Real Comfort

The one thing emphasized most forcibly by this year's automobile shows was the steady development of those features which add comfort and convenience to both electric and gasoline motor-driven pleasure cars, according to Otto Marx, vice-president of the Milburn Wagon Company, Toledo, Ohio, manufacturer of the Milburn Light Electric.

This very fact accounts for the increasing popularity of the electric. People realize more than ever before that in no other kind of power-driven pleasure vehicle can they get such comfort and luxury. The necessity for shifting gears time and time again on every trip with a gas car is tiresome and a cranky motor is a nightmare to the motorist. Even in its present state of development, the gas car is behind the electric from the standpoint of general utility, economy, comfort and luxury.

The superiority of the Milburn Light Electric over other electrics is equally pronounced. The owner of a Milburn is never conscious of any effort required on his part in the operation of his car. It could not be simpler or easier to handle. And its touring radius being 60 to 70 miles on one charge, enables him to use the Milburn for every purpose.

Its lightness in weight accounts for its unusually low cost of operation and up-keep expense, even though it is a large, roomy car.

## Greatest Prosperity in History

In connection with the prosperity that the automobile business in general is feeling, it is interesting to note the particular prosperity that the electric car industry is enjoying. Andy Hutchinson of the Deroit Electric Sales Company, in Indianapolis, Indiana, says:

"Never before in the history of the company has the American motoring public shown such marked interest in the electric-powered automobile. Large as were the crowds that thronged the Detroit electric booth at the New York show they are far surpassed by those at the Chicago Coliseum. Numbers of sales are being closed daily. Dealers from all parts of the country who attended the show state that the sales outlook in their respective territories has never been brighter.

"A scrutiny of our sales records for this present year reveals the fact that we have more than doubled the number of sales registered up to this time last year.

"Although for a number of years the Anderson Electric Car Company has been an unquestioned leader in the electric car field, the end of this year will see it intrenched in a position even more impregnable. Although many might comment on the fact that we will double our output this year as a remarkable fact, I am inclined to view it as the natural and logical result of placing before the people a high-quality product at the right price.

"The motoring public is coming to realize the many inherent advantages of the electric-powered automobile as a year-round car for all the family, and I look for an even greater demand for Detroit electrics in the future than the past ever saw.

## Tell Them to Use Electrics

Horse-drawn vehicles will take the place of motor trucks now in use by many Minneapolis concerns if the price of gasoline continues its upward trend, according to Roy D. Simning, secretary of the Automobile Trade Association of that city.

The use of both pleasure cars and motor trucks, it is predicted, may be curtailed.

Mr. Simning has announced that an investigation into the advance in the price of the product started by the council fire committee would be taken up by the trade association and an effort made to discover the cause.

## The Trailer Question

Add to the motor truck sufficient modern trailer equipment and supply a suitable road surface upon which to operate them together and consider possible results carefully.

First a few pertinent facts relating to drawbar pull will be interesting. For, however successful the motor truck has proven in carrying freight over short distances, its ability to carry freight is far below its capacity as a puller, as well as a carrier. The substantial economy of the motor truck lies in its pull.

The pull, or drawbar pull, as it is termed, which a truck is capable of exerting when traveling with its load has only lately received attention. Investigation of the subject has developed very interesting facts. Some of these briefly stated follow:

The drawbar pull of a truck is approximately one-half its load. Thus a fully loaded three-ton truck will exert a horizontal pull of 3000 pounds. In utilizing this pull the gasoline consumption is increased only about 10 per cent.

To move a ton of load on a suitable trailer vehicle over a smooth, level pavement requires approximately 40 pounds' drawbar or horizontal pull. Twenty pounds additional is required for each 1 per cent of grade encountered. That is 60 pounds on a 1 per cent grade, 80 pounds on a 2 per cent grade, 100 pounds on a 3 per cent grade, and so on.

From the above a simple calculation will show a three-ton truck, in addition to carrying its load of three tons, capable of pulling 25 tons on a 4 per cent grade, 30 tons on a 3 per cent grade, 37½ tons on a 2 per cent grade, and 50 tons on a 1 per cent grade.

In other words, by utilizing the drawbar pull the truck's hauling capacity has been increased 933 per cent, 1100 per cent, 1350 per cent, and 1767 per cent, respectively, on the grades named, this with a 10 per cent increase in power consumption and by using the drawbar pull.

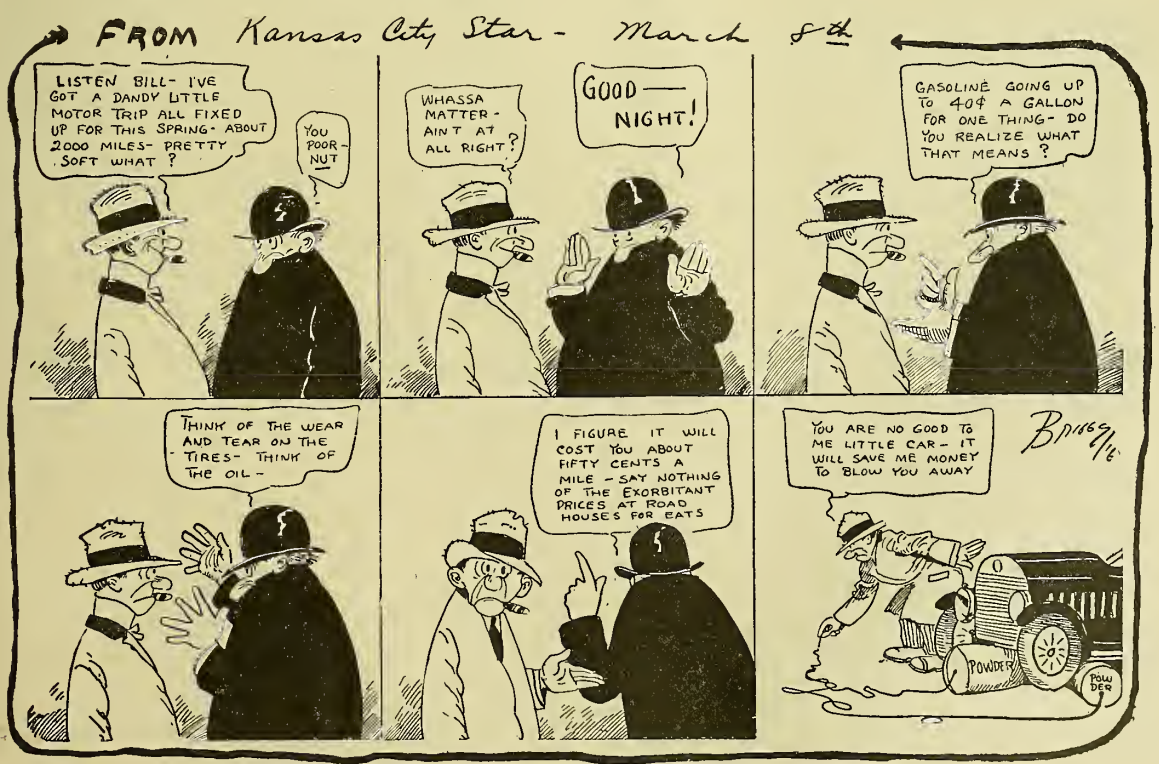
Such large economies appear at first thought incredible, but by a moment's reflection it will appear almost as reasonable that all of the freight hauled by a freight train shall be loaded upon the engine as to expect the motor truck alone to carry its full tonnage capacity.

So much for the vehicle; now the road. All of us in a general way and for general reasons favor low grades, but few appreciate that the same power hauls only half as much on a 4 per cent grade as on a 1 per cent grade. Accordingly, the cost of haul with motor truck is twice as much on the former as on the latter.

Another very important factor is the smoothness of the road surface. Upon a perfectly smooth surface the speeds of heavy loads may be doubled, as against usual operation upon present-day, hard-surface roads. Undulations in the best of these roads restrict speeds of heavy loads to from 8 to 12 miles per hour. Ten miles is a high average. If there is no jar or vibration caused by the road surface, a doubling of heavy load speeds is entirely practicable. This not only cuts the cost of haul in half, but also still further reduces this cost by decreasing power consumption.

---

A significant sign that the vogue of the motor truck is country-wide is clearly demonstrated in the fact that 31 different states now have their own truck manufacturers, some, of course, having more than others.




*And the Moral to This Family Newspaper Story Is: ELECTRIC POWER IS ALWAYS CHEAPEST!*

## Fighting Forty Cent Gasoline

"If Congress will put an embargo on the exportation of gasoline New York consumers will be able to purchase it at fifteen cents wholesale," declares H. J. Benjamin, a prominent member of the Motor Truck Club of America. Every member of his club, he said, will take whatever steps necessary to bring this important problem to the attention of their representatives in Congress.

"A representative of the Pure Oil Company was recently in my garage discussing the present and prospective price of gasoline," said Mr. Benjamin. "I told him that unless we had some federal legislation making public the statistics of the supply of crude oil in the various fields the consumer always would be in the clutches of the refiner.

"I was rather amazed at the frankness of my visitor when he said: 'If the government doesn't compel us to make public these statistics is there any reason why we should? Can you blame us when we set a price that we know the consumer not only must, but will pay?'

"I discussed with him the possibility of Congress taking some action. He replied that he was surprised the question had not been taken up on the floor of Congress long since.

"You know that with the fifteen to twenty thousand automobiles that have been shipped to the allies since the outbreak of hostilities, there is a tremendous drain on our gasoline supply.

"As matters now stand we are not only materially helping the allies by giving them the cars they need, but we are dealing a tremendous blow to the automobile industry in this country.

"Every man who drives a car or a gas truck is the sufferer. The millions of gallons of export gasoline necessary to feed the tanks of those automobiles we sent to Europe means that the price will continue to rise.

"For my part I wouldn't be surprised if it went to 50 cents."

Automobile Row, on upper Broadway, was a unit in expressing surprise that the Standard Oil Company had not sent out its monthly circular announcing an increase in the price of gasoline. In fact wagers had been made freely among dealers whether the increase this month would be one or two cents.

A number of men who represent the big manufacturers in the New York field were unanimous in the opinion that Congress should stop the exportation of gasoline.

None of which does the electric any harm.

## Plan Reserve of Trucks for Army

There are more motor trucks in the United States by 10,000 than there were in the whole of Europe at the beginning of the war, and if a plan could be formulated whereby these trucks could be placed in immediate services in case of war, a big step would be accomplished in the direction of national preparedness.

This was the significant point brought out at the monthly meeting of the Motor Truck Club of America, held at the Automobile Club of America, New York city.

"What Truck Owners Can Do for Preparedness," was the subject of the evening. S. Stanwood Menken, president of the National Security league, and the first speaker, spoke of the importance of having trucks now in use so designed that military bodies could be easily applied to them on short notice. This was part of Germany's preparedness measures taken before the outbreak of the war.

The importance of being able to mobilize troops at various points because of the great length of our coast line was outlined by Captain Kenneth Gardner, of the National Guard of New York, who thinks that this, of course, can only be done by the use of the motor trucks.

The difficulty of operating fleets of trucks that varied in general design was also discussed. The standardization of all trucks in a particular division train was found in Europe to be essential to satisfactory results.

Enrollment by military authorities of only those trucks that are required for immediate use in event of war was also claimed as important. It was found in Europe that when all trucks were called upon at one time many lay idle for several days, when they might just as well have been used by their owners

## Demurrage Eating Up Agents' Profits

American truck manufacturers who are endeavoring to develop a permanent export business have met with a serious obstacle over which they have no control.

When the European war began the larger makers were swamped with orders which came, for the most part, direct from the allied armies. France, England and Russia had already absorbed the trucks in those countries. New vehicles were purchased and old ones were commandeered, thus leaving the users of commercial vehicles in need of others in order to carry on their business activities as usual.

They turned to the agents for American trucks and the result of this demand for business cars was the placing of many orders with American makers whose product had not been taken up for army uses.

These makers foresaw an opportunity to develop a permanent export business and began to increase their production. At first they had little difficulty in landing their trucks in New York for export. During the past six months, however, they have been unable, one account of the congested condition of the freight carrying railroads, to reach New York.

Their agents abroad have been placing orders f. o. b. the American factories and the makers, unable to deliver the machines in New York, have been shipping to Boston and southern ports for export.

Now comes to pass that these vehicles are piling up at the eastern and southern ports because it is impossible to get enough ships to take them abroad. The demurrage is, of course, charged against the agents on the other side, and in some instances these charges have eaten up the agent's profit.

The superiority of the motor fire truck over the horse-drawn truck was demonstrated in Laurel, Alabama, very recently when the truck from the central fire station made the run to East Kingston, a distance of one mile and a half, and saved a residence. The Kingston truck, drawn by horses and located within a half mile of the fire, reached the fire several minutes after the central firemen turned their first stream of water on the blaze.

## Oppose Tax in California

San Francisco representatives of the automobile industry are very much interested in the proposed legislation in Santa Clara county governing the operation of motor vehicles for transportation purposes.

According to officials of the Motor Car Dealers' Association, the proposed ordinance would practically prohibit the operation of motor vehicles for freight or passenger transportation purposes in Santa Clara county, and would vitally effect the motor truck industry in the state.

Under the proposed ordinance motor trucks classed as common carriers, especially as applied to passenger carrying buses, would have to have a bond of one hundred dollars for fourteen passenger capacity, and an additional two hundred dollars for every extra seat. The average type of passenger buses now in use down the peninsula carry twenty-four passengers, and this would mean that a bond of twenty-one hundred dollars would have to be put up with the county for every bus in operation. A company operating a line of ten machines would have to put up a cash bond of twenty-one thousand dollars.

The ordinance also provides that 5 per cent of the gross receipts of the company operating the trucks should be paid to the county. This would be in addition to the state vehicle tax, the chauffeur's tax, and any other taxes levied against motor vehicles in this state.

The officials of the Dealers' Association state they do not want any favors from the state or county, but they want fair treatment for the motor trucks.

"We want the motor trucks of passenger buses treated on the same basis as any other common carrier," said J. A. Marsh, president of the Dealers' Association. "The operators of truck lines for transportation of freight or passengers should be under control, and should be compelled to establish their liability to the public and to the state; but, at the same time, the operation of motor trucks for commercial purposes is of enormous value to the public and will continue to grow in the commercial life of the country. As such it is entitled to fair treatment and encouragement, rather than discrimination.

"The Motor Car Dealers' Association is interested in the future development of the motor truck as a factor in transportation, and with the improvement of highways throughout the country it is hard to say just how far or how fast this development will occur. Quick and convenient transportation is what the public wants, regardless of motor trucks or trains; and, if the trucks can successfully compete with railroads and reduce the cost of shipping for the merchant and farmer, their use should meet with favor."

## Electric is a Climber

The "every-day" performance of the modern electric automobile seems to conclusively prove that it has arrived at the dawn of a new era, prophesied for several years past by electric car enthusiasts.

Not more than a year or two ago it was considered impractical to attempt the use of an electric car for general family use in cities where severe grades had to be climbed in getting about town. Now it appears from actual tests made by users of Detroit Electric cars that any grades or roads negotiated by any type of vehicle may be easily covered by the Detroit Electric. Not only is the power sufficient to meet the most unusual strain but the new cars are equipped with every possible automatic safety device to care for any emergency that may arise when operating the cars in very hilly districts.

An interesting series of tests was recently conducted in the hilly city of Ithaca, New York. One of the big automobile agencies in Ithaca conducted the tests under its own jurisdiction with the idea in view of taking the agency for Detroit Electric cars if their performance on the hills proved satisfactory. The results can best be expressed by one interested in the agency and who personally watched the Detroit Electric in action:

"The demonstrations made over the hills here have proven beyond a question of a doubt that the modern electric car is practical for Ithaca and any other hilly city where an automobile is desired for the entire family's use. The power, speed, splendid riding qualities, easy operation, safety, and elegant appearance of the modern electric car assure it a place of prominence in the automobile world worthy of the highest commendation. This fact has been proven to me in a most forcible manner by actual tests of the most severe nature. We are now selling Detroit Electric cars, and are making strong friends of our customers to whom we sell them."

## Reasons for Using Trucks

The following list of reasons have been submitted by a truck owner in Nashville, Tenn., and addressed to the men who still use horses for their deliveries:

I have been asked why I use motor trucks. I could give many reasons, but the following are most important:

I found that I was losing business to competitive firms that used motor truck delivery. This set me to thinking.

I found that trucks were being successfully used in practically every line of business and as a result I tried them in mine.

I found that I could cover more than twice the ground that I could with horses and that I could reach districts from which I had never been able to draw any business before.

I found that I could make more frequent deliveries and give better service to my customers because the truck covered the ground in less than half the time my horses did.

I found that trucks were absolutely reliable and that with proper care I could have every truck on the job every morning.

I found that during the rush season I could work my truck twenty-four hours a day if necessary, while I needed relief horses every twelve hours' work.

I had always used horses, yet I had never stopped to figure how much they cost me. I found that there were many extras which made a costly total at the end of the year.

I found that I saved money by the installation of motor transportation.

I found that each truck replaced three or four wagons. This cut down the number of men on my pay-roll.

I found that trucks cost only when they were in use, while my horses eat their heads off on Sunday and required attention day and night.

I found that I could give up my big stable, which had to be close at hand, and take a smaller garage, where rents were cheaper because trucks could cover the ground quickly and easily without tiring.

I found that, although my investments in trucks has yielded big dividends in money saved, it has yielded me greater dividends in the increased efficiency of my delivery service.

From my experience no petty saving in operating expense would ever compensate me for returning to the infinitely inferior horse system of delivery.

You will find these same things will hold good in your line of business if you give trucks the chance, and for the sake of your business I urge you to investigate.

## Westinghouse New York Service Station

An instance of the recognition of service in connection with automobile accessories is to be found in the automobile service station maintained by the Westinghouse Electric & Manufacturing Company at 250 West 54th street, New York, where cars equipped with

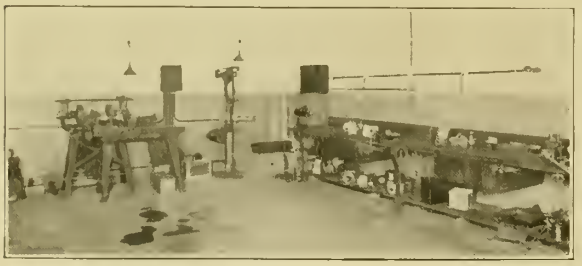



*Westinghouse New York Service Station.*

Westinghouse apparatus are cared for. This company also maintains in the same city a repair shop and service station for general electrical machinery so that the establishment of separate headquarters for automobiles indicates the desire of this company to specialize in automobile service.

Owing to the fact that the electrical and mechanical corps at this station consists of men that have been trained at the Westinghouse works the service rendered is especially rapid and a surprisingly small amount of space suffices for the necessary service for the district, which includes Greater New York and the territory that extends west as far as Syracuse.

The shop equipment includes the necessary machine tools, a motor generator battery charging outfit,



*Mechanical Equipment of the Service Station.*

an air compressor, and testing tables for determining the characteristics of engines, ignition, lighting and starting apparatus. A complete line of repair parts are in stock at all times, and lighting and starting equipment is for sale for attachment to used cars. A limited amount of high grade lighting and starting installation is handled for the New York agents of several of the most important cars in the country.

The sales-service station is under the management of S. D. Levings, assisted by G. E. Hanken. E. A. Cousins superintends the shop department.

## To Buy Electric Trucks

Postmaster Clore of Cincinnati, Ohio, has received notice from Washington, D. C., to the effect that sealed proposals will be received by Postmaster-General Burleson until 2 p. m. March 14, 1916, for furnishing and delivering, from time to time, electric auto trucks of one, two and three tons capacity. A copy of the notice was sent to the Chamber of Commerce, with the view of interesting Cincinnati manufacturers of automobiles.

## H. D. Eddy Joins Detroit Electric

H. D. Eddy, for the past six years connected with the sales and sales management of the Woods Motor Vehicle Company, Chicago, has recently become associated with the Anderson Electric Car Company, in connection with the Chicago branch, for the promotion of sales of the Detroit Electric, principally in Oak Park, Maywood and the western Chicago suburbs. Mr. Eddy's efforts will be devoted to special sales work. This recent connection has caused considerable comment on Automobile Row in Chicago for the reason that Mr. Eddy is considered and looked upon as an authority on the electric vehicle and his joining the Detroit Electric organization is an evidence of good judgment on the part of both the Anderson Electric Car Company and Mr. Eddy himself. The many friends and acquaintances he has made in the industry in the past six years will be glad to hear of this new connection, which affords him a wider and greater field of endeavor.



*H. D. Eddy.*

City officials and firemen in Ottawa, Kansas, held one of their regular conferences at the city hall at which the advisability of purchasing motor fire-fighting apparatus was discussed. Some additions are needed at the department and a new team or a motor conveyance will be necessary soon. Chief F. L. Blake, J. T. Black, S. T. Cole and G. L. Dewald met with the city commissioners.

The city council in Jacksonville, Illinois, is planning to add two motor trucks to the fire department equipment. A motor truck of the kind for which Commissioner Matrin has drawn specifications is a combination chemical and hose wagon.

# Voluntary Liquidation Sale

Our complete stock of new Buffalo Electric pleasure cars and one-ton motor trucks, also large stock of wheels, axles, springs, etc., suitable for building either Gasoline or Electric chassis.

*Call or Write*

**Buffalo Electric Vehicle Company**
1219 Main St. BUFFALO, N. Y.

# A Subscription to Electric Vehicles Helps to Solve Your Selling Problems

¶ Send along the name of your prospect, and with the the first copy of ELECTRIC VEHICLES will be sent a card telling that it comes from you and will be a visitor for a year, a monthly reminder of your good will and friendly interest.

¶ If you have one prospect the cost will be one dollar and fifty cents.

¶ One lucky dealer with twenty prospects sent his entire list.

**Electricity Magazine Corporation**
MONADNOCK BUILDING
CHICAGO, ILL.

RENT AN

# UNDERWOOD

## TYPEWRITER

It is the simplest in construction, easiest in operation, and deservedly the most popular machine of the day.

The "Just as good as the Underwood" argument, advanced for the sale of other typewriters, sums up all the proof of Underwood supremacy.

"The Machine You Will Eventually Buy"



Binder Closed

## Save Electric Vehicles

**For Future Reference**

By special arrangement with the manufacturer, we have been able to secure the only practical magazine and periodical binder on the market. We refer to the

**Dowst Magazine Binder**

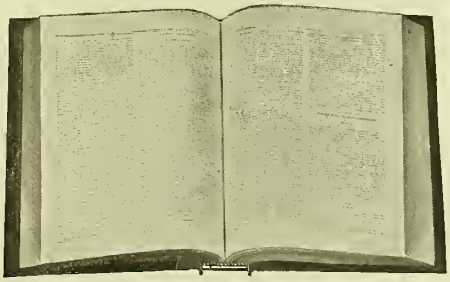
which binds one issue, a dozen issues or more with a neat book appearance. This binder has no springs, catches, strings, clamps, laces or locks, and does not mutilate the periodical in the slightest manner.

No mechanical labor necessary. Simple. Practical Durable.

**A Positive Gurantee**

The manufacturers guarantee to us that every binder is thoroughly tested before it is delivered, and a further guarantee that it will simply and practically accomplish everything claimed for it.

**Price Postpaid $1.50**
Complete with 13 Binding Rods 10 Sectiona Posts and Name of Publication Stamped In Gold on Front Cover


Binder Open

*Send for Illustrated Pamphlet*

**ELECTRIC VEHICLES, 1460 Monadnock Block, CHICAGO, ILL.**

CHICAGO ELECTRIC

The great value of the

# *Chicago Electric*

lies in its unequalled ability to serve continuously and uninterruptedly for the longest period of any motor car built. Records of forty and fifty thousand miles continuous satisfactory service have already been covered.

## New Edison Models

### $1,615 to $2,275

Our deferred payment plan and Battery Rental System make it easy to own a Chicago Electric

THE BEST BUILT ELECTRIC IN AMERICA

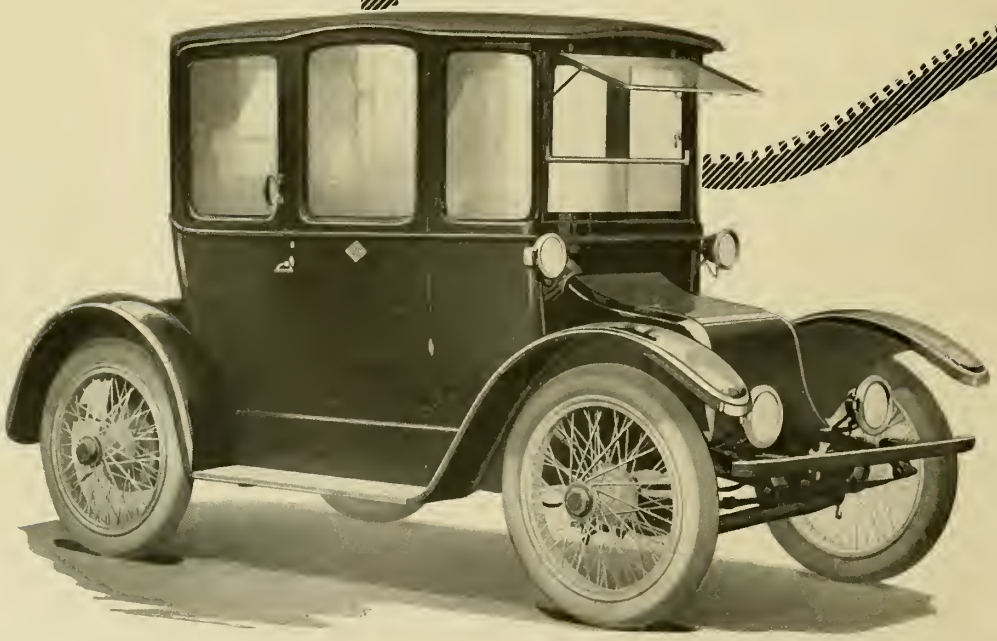
## Walker Vehicle Company

CHICAGO

*Manufacturers of Chicago Electric Passenger Cars and Walker Electric Trucks*

Chicago Salesroom:
2700 Michigan Avenue
Tel. Calumet 3000

Evanston Branch:
1013-17 Davis Street
Tel. Evanston 481



# ELECTRIC VEHICLES

A MAGAZINE FOR THE ELECTRIC MOTOR CAR USER. $1.50 PER YEAR. 1253 MONADNOCK BLDG.

Vol. 8 CHICAGO, APRIL-MAY, 1916 No. 4-5



DETROIT ELECTRIC ON MEMORABLE RUN TO NEW HUDSON

**While the cost of gasoline increases the cost of electric current decreases**

# Detroit Electric



## Today more purchasers of the practical "all-year-round" cars buy Detroit Electrics than any other make, either of gasoline or electric type

To the serious-minded seeker after the truth about motor car values this marked public preference for the Detroit Electric is significant.

For it means that the largest single group of the "all-year-'round-car" buyers in America has reached the conclusion that the Detroit Electric is the car that offers the best investment.

Remember, there are enclosed automobiles lower in price than the Detroit Electric. And there are enclosed automobiles higher in price.

Yet far more buyers of the "all-year-round" type of car select Detroit Electrics than any other—either of higher or lower price, or of gasoline or electric type.

Evidently then, it is not price that has won for Detroit Electrics this place of prominence in the minds of critical motor car buyers.

It is the car itself—its quality—its performance—its visible, provable superiority—that has earned this overwhelming endorsement. Strong claims for Detroit Electric performance are easily proved by a practical road demonstration.

***Remember—the Detroit Electric is a quality car at a moderate price***

## Anderson Electric Car Co.

**Detroit, Michigan**

(130)

Published Monthly By
ELECTRICITY MAGAZINE CORPORATION
Monadnock Building
CHICAGO

Entered at Chicago Post Office as Second Class Mail Matter

# ELECTRIC VEHICLES

WITH WHICH IS INCORPORATED IGNITION
TRADE MARK REGISTERED IN THE UNITED STATES PATENT OFFICE

SUBSCRIPTION PRICE
Domestic - $1.50
Canada - - $1.75
Foreign - - $2.00

FOR SALE AT ALL NEWS STANDS

If Your News Dealer Will Not Supply You—Please Notify Us

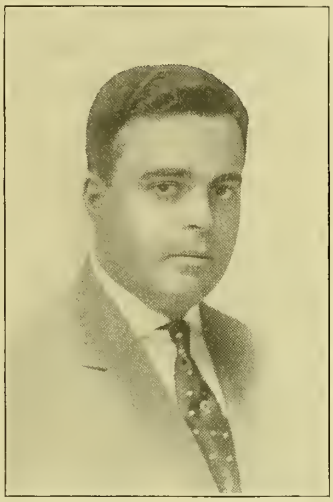
Volume VIII | CHICAGO, APRIL-MAY, 1916 | Number 4-5

# Cost of Gasoline—The Electric's Opportunity

*Some Interesting Operating Costs and Comparisons Drawn*

BY A. JACKSON MARSHALL

IT MIGHT be interesting to note that there has just been incorporated in the State of New York the United Motor Fuel Corporation of Manhattan, with an initial capital of $25,000, which, however, will ultimately be raised, I am advised, to between $5,000,000 and $10,000,000, or whatever amount may be found necessary to carry out the project for which the company has been formed, which is to produce gasoline, kerosene, lubricating oil and all by-products of petroleum, not, it is said, for the purpose of injuring the business of the present manufacturers, but to show that the price of gasoline could be materially reduced without the loss of profit. It is reported that the National Automobile Chamber of Commerce, which represents most of the automobile manufacturers of this country, is very much interested in this development.



*A. Jackson Marshall, Secretary Electric Vehicle Section N. E. L. A.*

Simultaneously with the announcement of the filing of the papers of the United Motor Fuel Corporation of Manhattan came a statement from Dover, Del., that a corporation known as the People's Engine Products Company, with a capital of $4,000,000, had been formed April 4th, to manufacture, produce and refine, buy, sell and handle in every legal way petroleum, gasoline and lubricating oils.

The firm of C. T. Silver Motor Company of New York, Brooklyn, Newark, Bronx and Yonkers, distributors of the Overland, Willys-Knight and Peerless cars, advertises that it will furnish gasoline at 25 cents a gallon to retail purchasers of its cars from March 20 to September 20.

Silver's plan is this: A ticket will be presented to each retail purchaser of a new car, entitling him to gasoline at 25 cents per gallon, at either the headquarters of the company in New York or any of the branches.

So far as we can ascertain, no provision has been made for supplying the Overland, Willys-Knight or Peerless car purchasers of the New York district with gasoline at a definite price after September 20, and I have heard a number of persons interested in the purchase of automobiles advance the thought that if the Silver company cannot guarantee a price not greater than 25 cents per gallon after September 20, it would indicate that the users would be called upon to pay a higher rate, and this condition of uncertainty and possible higher gasoline costs are having a marked effect on the sale of gasoline cars.

Furthermore, be it noted that in order to get the gasoline in Greater New York at 25 cents per gallon under the Silver plan, it will be necessary for the automobile to go to the headquarters or one of the branches, which may mean a distance of several miles, requiring the use of gasoline, tires, etc., which may in many cases offset any preferential gasoline rate which the motors might otherwise enjoy.

Innumerable instances could be given which would indicate the very serious situation engendered by the high cost of gasoline. On the other hand, the cost of electricity for charging electric vehicles is constantly being reduced, and the time does seem most opportune to emphasize the inherent economies of the electric.

There are also newspaper reports that some officials of the United States Government favor the government going into the manufacture of gasoline and some crude oil by-products for use by the Navy and other government requirements.

There is also a report that the Pittsburgh Automobile Dealers' Association is overlooking nothing in its campaign for a substantial reduction in the price of gasoline, and has agreed to buy no more gasoline from the Standard Oil Company until its prices are justified.

An official of the Pittsburgh Automobile Dealers' Association is quoted as stating that today every buyer of a car in Pittsburgh would be asked to refrain from buying from the Standard Oil until the prices come down to a normal basis.

In an effort to minimize the effect of increasing gasoline cost on users and possible purchasers of gasoline cars, many schemes are being employed by gasoline interests, and the following article appearing in the current issue of the *Club Journal* (the official organ of the Automobile

Club of America, New York), by Herbert Chase, the club's chief engineer, is interesting:

"The rapid rise in the price of fuel used in automobile engines has resulted in certain apprehension on the part of motorists, as to its effect on the general increase in the cost of motoring. Having this fact in mind, the club has recently been accumulating data with the view to determining the exact percentage of increase in car operation due to the rise in fuel prices. A careful analysis of this data reveals the fact that other expenses resulting from the use of motor cars are such as to make the rise in the price of fuel an almost negligible factor in considering total expense. This is said not with a view to disparaging any efforts that may be on foot to minimize waste and decrease the average fuel consumption in automobiles, but rather to show that similar economy in the other expenses incident to motoring may be made to offset the increase in fuel prices. The data given in the appended table was compiled by an examination of the cost accounts of five town cars used almost entirely for city operation in cold weather, when the fuel consumption per mile is at a maximum.

COST PER MONTH OF OPERATING LARGE TOWN CARS.

| Car | 38 HP | 51 HP | 38 HP | 32 HP | 25 HP | Avg. | Per Cent of Total |
|---|---|---|---|---|---|---|---|
| Miles traveled | 903 | 883 | 862 | 1,005 | 590 | 848 | .... |
| Fuel consumed, gallons ... | 141 | 175 | 147 | 121.5 | 119 | 140.7 | .... |
| Cost of fuel at 30c a gal. | $ 42.30 | $ 52.50 | $ 44.10 | $ 36.45 | $ 35.70 | $ 42.21 | 27.6 |
| Cost of lubricants ..... | 1.59 | 2.17 | .87 | 2.73 | .... | 1.45 | .9 |
| Tire expense. | 50.91 | 54.95 | 39.31 | 48.78 | 33.89 | 45.57 | 29.9 |
| Insurance ... | 29.13 | 17.14 | 10.35 | 13.80 | 7.47 | 15.58 | 10.2 |
| Storage ..... | 40.00 | 40.00 | 40.00 | 40.00 | 40.00 | 40.00 | 26.2 |
| Supplies, license fees | 4.14 | 13.66 | 3.54 | 15.36 | 2.76 | 7.91 | 5.2 |
| Total ... | $168.07 | $180.42 | $138.17 | $157.12 | $119.82 | $152.72 | 100.0 |

"It is to be noted that the record does not include any charges for depreciation, repairs or chauffeur's wages, three items which, if considered, would bring the total cost of car operation much above the figures given. Without considering these items and taking, the cost of gasoline at 30 cents per gallon, it has been found in the cases cited that the cost of fuel amounted to less than 28 per cent of the total operating cost; the other major items being tire expense approximately 30 per cent, storage about 26 per cent, and insurance about 10 per cent. If, without changing the other items, we take the cost of fuel at 20 cents a gallon, the price at which it retailed a few months ago, the ratio of fuel cost to total operating expense is approximately 20 per cent, tire expense 33 per cent, storage 29 per cent, and insurance about 11 per cent.

"If in making a comparison we include an item of depreciation charged at the rate of 20 per cent a year, and other items, such as repairs and chauffeur's wages, we shall find that the cost of fuel even at 30 cents per gallon is well under 10 per cent of the total operating expense.

"Looking at this situation from another angle it has been found that the average car operated from the club garages consumes about 3½ gallons of gasoline per day, this average including, of course, some cars which do not leave the building every day and others which are in almost constant service. An increase in fuel price of 10 cents per gallon would make a difference of only 35 cents per day, or approximately $10.00 per month in the cost of car operation.

"While discussing the subject of fuel consumption, it is well to consider a fact well recognized by all automobile engineers that the fuel consumption of the average car is fully 25 per cent higher than it need be if the operator would see that the carburetor is set and kept in proper adjustment. If all car owners would give this fact the consideration it deserves, not only would their own bills be lower, but the average consumption of cars in general would be so much decreased that the smaller demand should operate to decrease the retail price.

"Care should be taken to see that the compression of the motor is not allowed to fall off, due to an accumulation of carbon on the valves or to worn or loose-fitting pistons. By observing these simple precautions, the fuel consumption of the average car can be decreased from 10 per cent to 30 per cent, or even more."

It is interesting to note the second paragraph of the foregoing article, wherein it is stated that the cost record "does not include any charges for depreciation, repairs or chauffeur's wages, three items which, if considered, would bring the cost of car operation much above the figures given." The incomplete information given will be very interesting to compare with electric vehicles capable of performing the same services.

The tendency apparently has been for persons, when they have saved up sufficient money to purchase gasoline cars, to immediately lose sight of the investment and forget about depreciation, interest on investment, etc. Furthermore, the average human being does not desire to be reminded of what pleasure really costs, but when the cost of gratifying one's wishes becomes burdensome, a halt may be forced and the investigation which may follow might result in the employment of new methods in obtaining recreation. While it may be possible to forget the original cost, yet the gasoline motorist, who every so many miles has to replenish his empty tank with expensive fluid, is forcibly reminded that automobiling may be expensive, and if he also has advices that the item of gasoline represents but a small fraction of the total cost, it is likely that he would prove a fit subject for initiation into the realms of efficient and economic electric vehicle operation.



*The Comfortable Interior of a Magnetically Controlled Ohio.*

# Hard Rubber in Automobile Construction

*Presented at the Cleveland Section Meeting of the Society of Automobile Engineers*

BY McCONNELL SHANK*

ALTHOUGH rubber of the hardness of an automobile bumper or of a solid tire is often referred to as "hard rubber," that term as used in this paper refers to rubber compounds hard enough to be machined and polished. In Europe hard rubber is known as "ebonite." "Vulcanite" was originally a trade name for a certain compound, but is now synonymous with "ebonite" or "hard rubber." "Vulcanized rubber" is a term often applied to such compounds, but speaking accurately, soft as well as hard rubber is vulcanized.

Vulcanized rubber compounds may be hard by reason of either a more complete chemical combination of the rubber with sulphur or the presence of ingredients other than rubber and surphur. While the degree of hardness is controlled in both ways, the completeness of the combination of the rubber with sulphur is usually the greater factor. The finest grade of soft rubber, such as is found in a good rubber band, may contain 95 per cent rubber and 5 per cent sulphur and may have been vulcanized two hours, at a constant temperature. The finest grade of hard rubber such as is found in a good comb or fountain pen may contain 75 per cent rubber and 25 per cent sulphur and may have been vulcanized ten hours at the same temperature.

### PROPERTIES OF PURE HARD RUBBER

For the many purposes for which hard rubber may be used in automobile construction there are many qualities. The properties of hard rubber vary with the quality, of course. An idea of the properties of the various qualities can best be gained by taking as a standard and noting the variations of what might be called "pure hard rubber," which contains practically no ingredients other than rubber and sulphur.

Pure hard rubber ranges in specific gravity from 1.12 to 1.25. On account of the large percentage of sulphur necessary for proper vulcanization, it is impossible to make hard rubber with a specific gravity much less than 1.12. Hard rubber of fair commercial quality will usually have a specific gravity of 1.25 to 1.40.

The finest grades of hard rubber have a tensile strength as high as 7,000 pounds per square inch of cross section. Battery manufacturers who make tensile tests on their jars usually require a tensile strength around 3,500 pounds.

The U. S. Navy hard-rubber sheet specifications which require a fair commercial quality, call for a dielectric strength of 10,000 volts per 1-32 inch of thickness. Some battery manufacturers test their jars electrically with a pressure of about 25,000 volts alternating current for ⅛ inch of thickness. The finest hard rubber will withstand twice that voltage.

Hard-rubber compounds, except some that contain organic substances other than rubber, are moisture proof. Pure hard rubber is unaffected by most chemicals. Concentrated nitric and sulphuric acids, carbon bisulphide, aniline and benzol are the only chemicals used largely in a commercial way that affect it at ordinary temperatures. As compared with soft rubber, hard rubber deteriorates slowly.

Hard-rubber compounds before they are vulcanized are usually of about the same consistency as soft-rubber compounds, that is, they are of about the same consistency as stiff chewing gum.

Hard-rubber parts for automobiles are molded in two ways—from soft-metal or from hard-metal molds. Soft-metal molds are made from a matrix. The molds are stacked and clamped in racks and the vulcanization is done in a heater of the type formerly used for tires. Hard-metal molds for hard rubber are usually made from iron or steel the same as are those for bumpers and other soft rubber goods. The vulcanizing is also done in hydraulic presses.

### HARD-RUBBER PARTS FOR BATTERY EQUIPMENT

Parts for batteries include hard-rubber jars, covers, vents, bushings and separators. The more complicated hard-rubber covers must be molded. The less complicated ones may be molded or cut from hard-rubber sheet. The greater accuracy of dimensions that can be maintained with hard-metal molds is of greater advantage here than in connection with the parts previously mentioned. Most of the other parts must be finished after they are molded in order to give them the required accuracy of dimensions or character of surface. It is customary to grind the edges of molded covers fairly accurately to dimensions, but to leave the other surfaces practically as they come from the molds. To finish the other surfaces would greatly increase the cost of manufacture. In other words, molded covers must be molded fairly accurately, and this can be done more satisfactorily with hard-metal than with soft-metal molds.

Flat covers are usually cut from sheet, but when large in size, and the quantity required is large enough to warrant the cost of equipment, it is often advantageous to mold them. When the same compound is used, a stronger cover can be made by molding than by cutting it from sheet, and this is a factor in determining the better method of manufacture in order to produce a cover of a given quality.

The cost per cover for operating the molds is practically the same, regardless of the size of the cover. Consequently it often happens that of a certain type of flat cover it is most economical to cut the small ones from sheet and to mold the larger ones. Hard-rubber sheet from which covers are made is vulcanized between layers of tin in hot water. These sheets are about 28 by 48 inches, the exact size, of course, being determined so that there may be no excessive waste at the edges.

Battery manufacturers are probably more inclined to economize beyond the point of safety in the cost of covers than of other parts of a battery. The hard-rubber cover is so small than the addition of a cent or two in the cost of material makes a considerable difference in its strength, and often a cent or two may make a very great difference in the breakage in service.

### METHODS OF MAKING VENTS

There are two types of hard-rubber vents in common use, plain molded, and blown. The "plain molded" is made in the same manner as the other molded parts previously mentioned. The "blown" vents are made hollow by the expansion of water or other liquids on the inside,

*The B. F. Goodrich Co.

this expansion being caused by the application of heat during vulcanization. It is more expensive to mold goods when they are hollow. More expensive material is required. Of course, in some designs it is essential that vents be made hollow, but wherever it is possible in order to reduce costs, vents should be so designed that all holes and irregularities can be made by the means of molds.

TYPES OF BATTERY SEPARATORS

Separators manufactured in Europe are usually made from corrugated perforated hard-rubber sheet, or from perforated sheet with ribs molded integrally upon it. The corrugated separator is not altogether desirable because it will flatten out in service. The separators with the ribs molded integrally with the sheet have been too expensive for most American battery manufacturers. At the present time, however, hard rubber manufacturers are aiming to reduce their costs of manufacture for that type to a point where battery manufacturers can afford to use them.

Ribbed hard-rubber separators as they are made in this country today usually consist of hard-rubber sheet partly cured and perforated, and ribs vulcanized on the sheet aftewards. This type of separator is more durable than are the treated wood separators, while the separator with ribs molded integrally is still more durable.

Hard-rubber jars as used in this country are formed over mandrels and vulcanized while still on the mandrels. The jars are not put into molds but are simply wrapped with a layer of tin on the outside. The rubber manufacturer is frequently asked if this wrapping could not be dispensed with, thereby decreasing the cost of manufacture. The tin, however, is not a great item of expense because it can be used over and over again. It serves to hold the jar in shape during the vulcanizing process, and offers a convenient means for branding, for it is only necessary to make the impression with a die, and that is held by the tin in the compound while the jar is being vulcanized. Without the tin the jar would have a rough instead of a fairly smooth and well polished surface, dimensions could not be so well controlled, and the expense of straightening the jars after vulcanization would just about offset the cost of using the tin.

THICKNESS OF JAR WALLS

The thickness of wall required for a hard-rubber jar in automobile work in order to give the proper service, depends upon the quality of rubber used. Walls ⅛ inch thick are now fairly standard for starting and lighting work. Walls 3-32 inch thick, if only the finest grade of materials were used, might be satisfactory, but so thin a wall it not recommended because such thin material is difficult to handle satisfactorily in the manufacture of a jar, and the percentage of defective jars is too great.

JAR BREAKAGE CAUSED BY ASSEMBLING

A great deal of the breakage of hard-rubber jars in service has been due not to the quality of the jar, but to the way it was assembled. If the wooden boxes are not square and fairly rigid, the bottom of the jar is frequently only partly supported. This is also true where the sealing compound is not distributed uniformly over the bottom of the battery box. In such cases a jar even of good quality will break either at the bottom or in the wall at the point where the top of the bottom ribs joins the wall.

RIGID SPECIFICATIONS REQUIRED

When battery manufacturers adopt specifications for hard-rubber goods, there is an inclination to make them too rigid. Jars may be rejected that would really be more serviceable than many that might pass the test. A certain specification might call for a tensile strength of 3,600 pounds and an elongation of 3 per cent. A jar might have a much larger percentage of rubber than would be necessary to meet these specifications if it were cured to the degree of hardness necessary to meet them, or might happen to be slightly under-vulcanized so that it would have a tensile strength of only 2,500 pounds or an elongation of as much as 10 per cent. Such a jar, although rejected, would be more serviceable than a jar that would just meet the specifications.

It will be well to add a word of caution regarding the so-called flexible jars. Any rubber manufacturer can furnish a hard-rubber jar that is flexible when it is new by simply making it from the compounds used in the manufacture of a rigid jar but vulcanizing it for a shorter length of time or at a lower temperature. Such jars were put into service as many as seven or eight years ago, but their use was discontinued. They were flexible, and almost unbreakable when new, but were more easily affected by the acid than the ordinary rigid jar, and hardened up rapidly with age and from the effect of the acid, to the point where they were more brittle than if they had been vulcanized to the usual degree of hardness.

With flexible jars, therefore, the problem is to furnish a jar low enough in price to be used in a commercial way that will not become brittle too rapidly with age, and that will not harden so as to make it unserviceable. Whether any given jar meets these requirements is something that can be determined only by actual service for the ordinary life of a battery.

Hard-rubber parts as they are now used in automobiles vary greatly in designs and sizes, and it is necessary that the hard-rubber manufacturer have an enormous investment in special equipment. Costs could be materially reduced if these parts were standardized. There is already considerable standardization of hard-rubber parts as used by railroads, and while in automobile construction standardization could not be carried to the same point, there is no reason why it could not be carried further than at the present time.

## Recent Chicago Purchasers of Detroit Electrics

Recent purchasers of Detroit electrics in Chicago are:

S. M. Gunder, 6219 Sheridan road; L. W. Meckstroth, 694 Irving Park boulevard; W. S. Ayres, 4726 Woodlawn avenue; M. F. Barrett, 4542 Drexel boulevard; W. S. Horton, 5419 Hyde Park boulevard; R. E. Peacock, 5552 Everett avenue; C. D. Bohling, 5321 Lakewood avenue; Clara Busse, 6900 N. Ashland avenue; W. J. Sinclair, 459 Deming place; D. S. Boynton, Highland Park; E. Zipf, Wilmette; Judge W. N. Cottrell, 4929 Lake Park avenue; Frank Kohler, 612 Stratford place; Jos. T. Milner, 4601 Grand boluevard; Mrs. O. W. Ludlow, Kenilworth; A. J. Mason, 5715 Woodlawn avenue; J. H. Fahrney, 3319 Warren avenue; Dr. Carl Wagner, 1532 N. Dearborn street; F. C. Tyler, 4557 Greenwood avenue; G. B. Ogle, 5337 Hyde Park boulevard; Max Mickel, 5848 Michigan avenue; H. Goodfriend, 656 E. 51st street; Z. Z. Jackson, Oak Park; J. Meier, Oak Park; W. L. Eisengart, Winnetka; J. Hardin, Minnetka; H. H. Hilton, 5640 Woodlawn avenue; B. C. Lingle, 2305 Commonwealth avenue; M. D. Witkowsky, 5424 East View park; A. C. Frost, 1245 Astor street; A. F. Banks, Evanston; S. M. Rogers, 5454 Everett avenue; G. L. Chatfield, 434 E. 48th street; Chester M. Dawes, 731 Rush street; Archie Andrews, Evanston; Jacob White, 834 Lawrence avenue; C. A. Tousey, 6215 Kenmore avenue; E. C. Amling, Oak Park;




*Buda Storage Battery Truck Type A Pulling Three Trailer Trucks Loaded with Lumber, Weighing 2,046 Pounds, 1,342 Pounds and 1,392 Pounds Respectively. The Truck Alone Is Carrying a Load of 1,890 Pounds. The Train of Loaded Trailers Travels from the Wood Mill to the Warehouse, Climbing a Grade of Ten Per Cent About 125 Feet Long to Do It.*

# The Economy of the Industrial Truck

## *The Little Cars Are Shown to Return Their Cost in a Few Months*

BY W. F. HEBARD

THE Committee on Industrial Trucks, which was appointed by the Truck Standard Division of the Society of Automobile Engineers, defines industrial trucks as follows:

The term storage battery industrial truck refers to electric vehicles employed for the purpose of replacing manual labor in the handling of material within the enclosures and adjacent to passenger stations, freight stations, express stations, docks, shops, factories and industrial establishments.

Previous to the introduction of storage battery industrial trucks and tractors, for the economical transporting of materials in such places as outlined above, under conditions which prevail in each case, there had been several different forms of devices developed, such as hand trucks of especial design which would be suitable for handling of various classes of commodities, industrial railroad tracks of special gauge to meet individual requirements, belt conveyors and telpher systems, etc. While equipment of this character has met with some success in reducing transporting costs, as a rule the comparatively high operating costs and lack of flexibility in operation has in a good many instances stood in the way of the general adoption of these devices for the transporting of such classes of commodities.



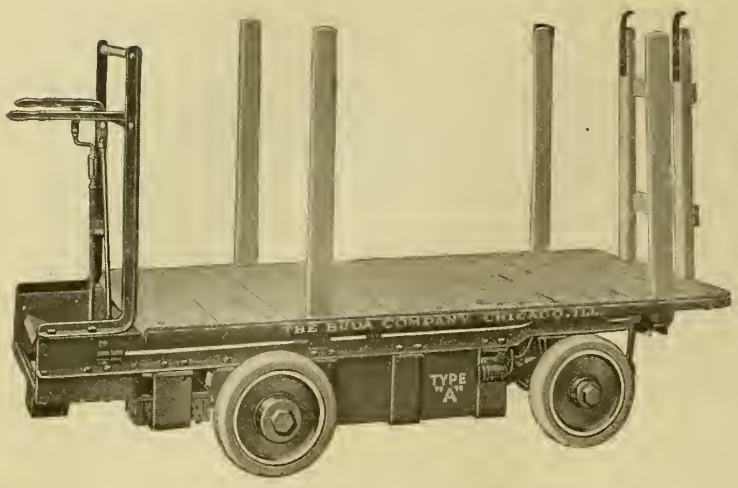

*The Buda Truck in the Yards of a Big Passenger Car Plant, Handling 32-volt Car Lighting Batteries in Three Inch Deep Snow. The Load Shown Here Weighs 3,400 Pounds. It Pays to Do It Electrically.*

Electric trucks and tractors are devices which have been produced in the development of devices for the most economical interdepartment transfer of materials.

Electric trucks and tractors accomplish, on a smaller scale, the same work as electric commercial vehicles. Industrial trucks are being adopted in connection with the transfer of materials over shorter hauls, and the prime object of both classes of vehicles is the same, namely, the transfer of materials, with dispatch, at a low cost.

The types of industrial trucks which were brought out originally, when the industrial truck field was first opened up, were burden bearing trucks, on which large platforms were available for the transfer of material from one department to another. However, modification of the original type of burden bearing truck have been developed, so that purchasers can select certain types of trucks which will provide the highest operating efficiency under the conditions prevailing in individual plants.

For instance, there have been certain types of trucks developed which are best suited for handling baggage in passenger terminals, one particular type being designed to handle baggage in stations where the




*Typical Truck Showing Loading Platform and Operators Controls. It weighs 1,900 Pounds with Lead Batteries and has a Capacity of 4,000 Pounds. The Over-all Length Is Eight Feet, Seven of Which Is Available for Loading, the Platform Being 20¾ Inches from the Ground. Its Maximum Speed is 7 M. P. H.*

tracks are of the approximate level of the passenger runway, and another type being designed with a low platform, for handling baggage in modern stations where the tracks are depressed.

Tractor trucks can be considered for use in certain types of passenger terminals, where baggage, mail and express are hauled over runways in secluded parts of the station where passengers do not enter. In such cases, tractor trucks can be coupled to long trains of trailers; the baggage, mail and express being loaded on the trailer trucks to be hauled to the various rooms to which such freight must be conveyed.

With the adoption of electric battery tractor trucks for stations of this class, where it is possible to use motor trucks, efficiency in the handling of baggage, mail and express is greatly increased, due to the increased unit load handled, at a low labor and power cost.

In order to give those interested a general idea of the economic value of storage battery industrial trucks and tractors, I would say that it can be conservatively estimated that an electric truck or tractor can be operated at a cost which will not exceed 15 to 20 cents per hour, including interest on the capital investment, at the rate of 6 per cent, and depreciation on the electric truck, aside from storage battery equipment, at the rate of 20 per cent, and on the storage battery equipment itself, at the generally accepted rate, as well as the item covering taxes and insurance. This includes the total item of fixed charges. Also, operating costs, including current for charging batteries, from direct current circuit, including rheostate loss; distilled water for replacing evaporation in the battery cells; as well as truck lubrication. However, this figure does not include the time of the operator or other labor.

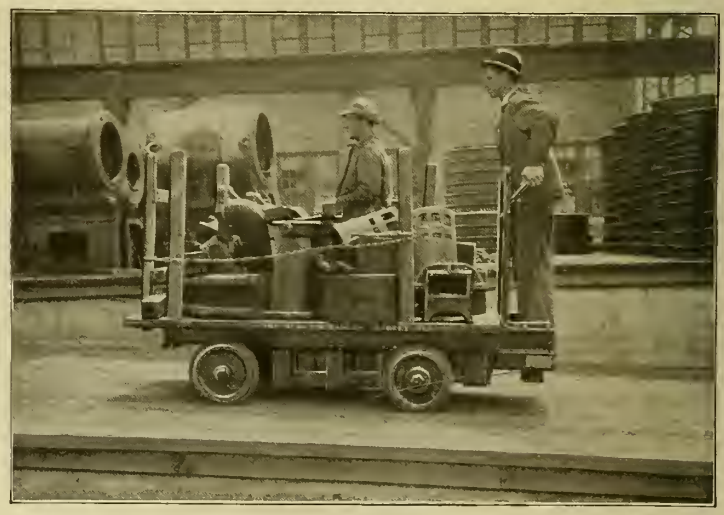
In maintenance expenses, the figure of 15 to 20 cents per hour includes repairs and the time of an attendant to make repairs and who would look after the items of battery charging, lubrication and other maintenance items.

In other words, it costs no more to own and operate a storage battery industrial truck or tractor, aside from the item of labor, than to engage the services of a manual laborer. Therefore, the economy of storage battery industrial trucks and tractors becomes apparent in their ability to replace manual labor, mules and other means of conveying materials.

All types of industrial trucks and tractors are designed and constructed with a view towards operating on fairly hard, smooth, level runways. Some types of trucks are designed and constructed for no other purpose than conveying loads on their own decks. For certain classes of work trucks of this type are the only type which can be considered for purchase, due to the physical conditions which prevail in certain plants. They will operate even in snow, as the accompanying cut, taken in a railway yard, shows.

Under other operating conditions it becomes readily apparent that a straight tractor truck is the only type of truck which can be seriously considered; the tractor being a self-contained power unit to be quickly attached to or detached from trains of trailer trucks—the material to be conveyed on trailer trucks. Where it is possible to use this method of haulage, the less expensive trailers can be tied up for loading and unloading purposes rather than more expensive motor trucks, of the burden bearing type.

Under other operating conditions, an electric truck with an elevating platform is the type of truck which would seem to best fit into the prevailing conditions and operate with the highest efficiency. With this type of truck, material which is to be transferred is loaded on false decks or skids, in the same manner as is followed



*This Truck, Also a Buda, Operates Between the Store Rooms and Shops at Havelock, Neb. It Is Shown Ascending a Seven Per Cent Grade Into the Shops with a 4,900-pound Load on Deck.*

in connection with the use of hand transveyors, the inexpensive false decks or skids being allowed to remain idle for loading or unloading rather than the more expensive motor truck.

For other conditions, it is obvious that an electric industrial truck, to which is attached a gooseneck crane, is the only type of truck which would show suitable efficiency in its operation, to warrant its purchase. For instance, in foundries, where a large tonnage of small castings is produced, this type of truck frequently proves its worth. The small castings are loaded into steel barrels, upon the sides of which barrels are lugs, for crane attachment. These barrels frequently weigh from 500 to 700 pounds. It is a difficult problem to lift them on the trucks by hand, but considerable saving in operating costs can be effected when this method of loading is provided to overcome the difficulty of loading such heavy units by hand.

In some plants, it is necessary to convey considerable tonnage of bulk material, such as coal, sand, cinders, etc., and it is frequently expensive to employ such conveyances as motor trucks, mule teams, or wheelbarrows. Electric industrial trucks with dumping hopper attachments frequently accomplish this work in a satisfactory manner. Dumping hoppers are frequently supplied on industrial trucks, of the burden bearing type, and save the purchaser considerable money in his operating costs.

To give an idea as to the general economy of electric trucks and tractors, it is my opinion that approximately 7 to 8 months are required to return to the owner the purchase price of an electric truck, through savings it effects in plant operating costs. Under exceptional conditions, it has been proved that electric trucks are capable of returning their purchase price within 3 to 6 weeks, and, in many cases, within two to four months, through savings they effect. Under other conditions, a somewhat longer period is required, but, as stated, it is my opinion that only 7 to 8 months are required, on the average, to return the purchase price to the investor, which, of course, is a very attractive return on a capital investment in machinery.

## Well-Known Accessory Firm Changes Its Name

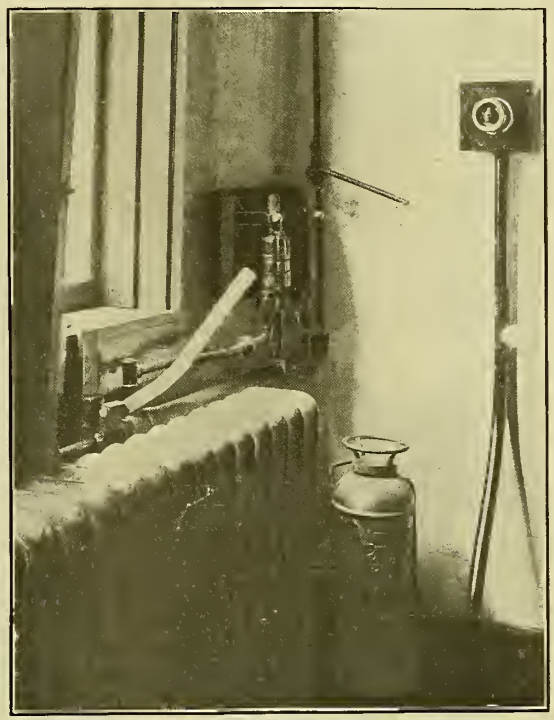
The Hartford Suspension Company, Jersey City, N. J., better known as the maker of the Hartford Shock Absorber—and one of the pioneers in the industry—has decided to change its name to Edward V. Hartford, Incorporated. It has been made clear that this does not mean any change in the personnel or ownership of the company.

"In the early days when the Hartford Suspension Company came into being," said Arthur Waterman, general manager, in speaking of the change, "it was organized for manufacturing and selling the Truffault-Hartford Suspension—subsequently called the Hartford Shock Absorber—and its name seemed appropriate, but since the company has gone into making a number of accessories, our board of directors have felt the name Hartford Suspension Company was a misnomer, and a change was desirable.

"This company is also a large advertiser of its appliances, and has suffered a certain amount of confusion in its mail, in that letters intended for the company have been directed to Hartford, Conn., the senders evidently thinking the company was a Hartford concern. The new name will no doubt overcome this difficulty."

## Pneumatic Door-Opener for Garage

At the garage of the Greenfield (Mass.) Electric Light & Power Company the main sliding door is opened and closed by an air cylinder, as shown in the accompanying photograph, shown by courtesy of the Electric Review. A 0.75-inch steel plunger traveling in a 1.5-inch cylinder operates the door upon the turning of one of



*Automatic Garage Door Opener.*

two engineer's valves shown in the corner of the room. Despite the fact that the door is 10 feet 6 inches by 13 feet 2 inches in dimensions, it can be opened or closed in 3 or 4 seconds. A home-made brake shoe with hand lever, shown behind the radiator, enables the door to be stopped immediately at any point in its travel. Compressed air from the garage system is supplied through a 0.375-inch pipe at about 40 pounds per square inch. The switch shown herewith controls the outside lighting.

## New Electric Company

The Belmont Electric Auto Company has been organized and will locate at Wyandotte, Mich., to manufacture an electric motor car of new design, the prices of the different models being given as follows: Delivery car, $985; four-passenger model, $1,400; six-passenger limousine, $1,600. The name of the new vehicle will be the Belmont, and it is expected that it will prove a distinct advance over the present types.

A feature will be the provision of a charging plant, for $150 additional, which will make the owner independent of charging stations and will enable him to motor across the country, if he desires, without recourse to public garages.

The president of the Belmont company is J. H. Bishop, capitalist of Wyandotte. The other officers will be announced later.

# Fashions for Milady of the Electric

*Modish Coats that will be Worn for the Cool Nights in the Summer*











*In the center a belted model of navy gabardine. It is lined to the waist. The large self revers may be worn buttoned close and pleated cape collar. Self covered buttons trim belt.*

*To the left, a stunning model of tan gabardine with loose back, belted front, patch pockets and many buttons fasten the front from neck to bottom. Half lined with peau de cygne.*

*To the right, a very nobby model in navy empress cloth cut very loose and full. The deep convertible collar is of black satin. Sleeves are gathered in at wrist with self cord ornaments. It is lined to waist with fancy Jap silk.*

*Garments Obtained Through Courtesy of Percival B. Palmer & Co., Chicago.*

# Electric Road Rollers and Better Roads

*Automatic Control Prevents Halts Which Cause Uneven Road Surfaces*

BY A. JACKSON MARSHALL

THE subject of electric road rollers is one which has had but slight consideration in this country. England, more keenly alive to the possibilities of electricity as a motive power than ever before, has favored the electric vehicle for municipal service in many and varied ways and an eminent English engineer has published in a recent issue of the London *Electrical Times* an account of his investigations and study of the feasibility of the electric road roller. England is growing accustomed to the electric vehicle and likes it. That it is an ill wind that blows no good is quite applicable to the electric truck situation in England at the present time, and while horses and gasoline trucks during the early part of the war were commandeered in great numbers for transport service, electric truck installations have been greatly increased and many concerns that had formerly employed either horse or petrol (to use the English term) equipment, have come to realize the superiority of electricity as a motive power for vehicles used in urban delivery and trucking industries of all kinds. With the cost of gasoline always high and now rising to prohibitive prices and the drastic measures which the English government has taken to prevent the gasoline supply from being entirely exhausted, it is reasonable to expect that England will turn to the electric vehicle which is dependent for its power on the great natural resource—England's inexhaustible coal supply. Municipalities have been forced to recognize the economy, simplicity, ease of operation and cleanliness of the electric, and the result has been the adoption of this type for many forms of municipal service. The Electric Vehicle Association of America, in a previous article on the progress of the electric in England, pointed out the fact that as a result of the action taken by the board of health of the city of Manchester to forbid the maintenance of stables in urban areas, electric vehicles have been adopted in the place of horses in several branches of municipal work. Electric omnibuses, electric fire apparatus, electric vans for the collection of refuse, electric street sprinkling carts are all very extensively used in England, and now comes the electric road roller.

During the past decade many material conditions have changed, in every respect favorable to the utilization of electric road rollers in city and town areas. One of the changes is the greatly increased use of electricity, and only a hopeless Philistine would suggest or believe for one moment that mere thriftiness, without the benefits of improved health and convenience, would account for the general adoption of electricity which we find today. Another important change is the improvement of all common roads resulting from the increase of power-propelled vehicles.

Naturally, in congested areas the unit stress on pavements is more acute, while the business aspect calls for a much higher degree of engineering capacity than that entailed by rural highways. Before 1865, when the steam roller was a nine days' wonder in Paris, horse rollers had been used and those were for many reasons quite unsatisfactory. In 1869 and 70 the first discussions on the steam roller took place in Birmingham, England, and related to water lubrication. From this date onwards, a point of great interest, now greatly modified by bituminous flux, is the unit stress upon the finished surface, imposed by the weight of the roller.

The pressure per square inch imposed on the road surface by the weight of the roller must, with water, be greater by 25 per cent than that of the heaviest vehicles using finished roads. Where a 30-ton steam roller supplied this condition, the effect with water lubricant was unduly to crush the metal. With a 15-ton roller this destruction did not occur, but the pressure was insufficient. As a lubricant and binding agent, bitumen has modified very considerably these considerations.

The speed of rolling should not exceed 2.5 miles per hour, and the horse-power, for which no indicator diagrams seem to be available, appears to be roughly one horse-power per ton gross. The 30-ton roller is no more. It is doubtful if the 15-ton roller will survive. If the commercial efficiency of an enclosed traction electric motor is taken at the convenient figure of 74.6 per cent, then for a 15-ton roller a 15 horse power motor equipment would require a specific discharge rate for its accumulator (storage battery) of 15 kilowatts.

The weight of the battery carried by any vehicle, states the *Electrical Times,* depends upon the specific discharge rate of the cells employed. But in this case the ten hour rate favored by battery makers fits in with a ten hour working day favored by road roller attendants.

Today the first demand is for an 8 and 10-ton roller for bituminous work, particularly for a roller with short road base for transverse work and patching. Such a roller, if electrically operated, can stand and charge all night. It can be worked with one attendant with the utmost simplicity and the minimum of effort. At any time it is ready instantly to go out to its work, without that one hour to get up steam which is necessary for a small steam patching roller, and it can be designed to travel at a good speed when running from job to job over normal roads where traffic resistance is lower than upon the actual work.

Allowing for a minimum discharge at a ten-hour rate and a maximum when rolling upon hills at a three-hour rate, an equipment of .75 kilowatts per ton is estimated. For an 8-ton roller at a ten-hour rate covering a ten-hour working day without recharge, such as could easily be given from suitable manholes, this gives 6,000 pounds at 10 watt hours per pound of cell, which is 2.68 tons of battery. We get, then, cells 2.68 tons, motor, etc., 1.0 tons, frame 1.22 tons, rolls 3.0 equals 8 tons gross.

As the roller advances and oscillates over a given piece, there is a point of stop and reverse. This point has puzzled the steam roller makers and led them to produce at great pains, a quick reversing link motion or other similar gear, whereby the halt at the change of direction may be reduced to the minimum. Here electric control is favorable, and the point is most important because undulations form in the roadway where these halts have occurred. In electrical working it is possible to cut off the current and allow the roller to decelerate while the motor has been switched to that connection which has changed its direction of rotation and started it to accumulate its effort in the reverse sense, all ready for an instantaneous reverse movement.

Because of the tendency to the formation of undulations or corrugations which develop later in traffic, due initially to these halts and reverse in rolling, three rolls in tandem have been advocated, instead of the time honored two side rolls and one center leading roll. In addition to this, the halt point, which with a good operator should not be a repeated point, should also be varied by different pressure upon the three, or upon two rollers. Thus the unit downward pressure upon the leading roller would be appreciably lower than upon those succeeding it. This can of course be easily arranged in the design.

Imagine the sensation and impression an automatic road roller would produce quietly doing its work with no attendant up, and set both for stroke and traverse over a given patch. For city work neither steam nor gasoline propulsion could compete with the electric automatic road roller. All automatic controls undoubtedly increase efficiency and precision. The electric road roller lends itself to automatic control. At the same time automatic control is likely to be a strong feature in urging common adoption of electric rollers.

With steam and gasoline there are other inherent complexities, and automatic controls cannot be nearly so simple as in the case of electricity. The real reason, however, why automatic road rollers have never been proposed is probably that only in the case of electric road rollers is the attendant not required continuously on the vehicle for purposes other than running control. Once the simplicity of electric driving and control is considered there follows naturally the simplicity of various means of setting the reversal distances and cross feeds, and the automatic road roller, with its obviously higher efficiency than with hand-feed and control, is the progressive result.

In addition to a type of electric roller weighing eight or ten tons, there is a demand in most cities for a four to six ton type. The latter would almost certainly be a one-man machine equipped with suitable materials as well as with heating and mixing trays and spraying devices, all complete for the repair of those numerous holes and ruts of one square foot upwards, which automobile drivers discover to their cost in every part.

There are few towns that would not benefit markedly by two or three of these one-man electric automatic repair rollers dressing continually the small pot-holes in the streets which are so injurious. These four-ton rollers would be of about the same weight in the frame as the eight-ton type, but lighter all around in the cells, rollers and motors.

On the whole there is no doubt that the low speed of rollers and short radius of service within a given area favor electric cells and propulsion. The Electric Vehicle Association is informed that there is every evidence now of a demand for electricity in England to supersede steam and the more modern gasoline and oil types of road rollers. It is not a question of plant, or of operating costs, for modern cities are prepared to pay without exception, even should there be an increased charge, for healthful improvements in silent workings and cleanliness, to say nothing of more uniform wear after automotic rolling. Electric road rollers constitute an improvement over and an advance upon the noisy and dirty working of steam rollers.

There are full, though many subtle reasons why both first and operating costs, as expressed to a city in current coinage figures, are quite secondary considerations in such engineering processes as electric road rollers. One has only to instance as an example such an increased cost as might reasonably be entailed by the conversion of a place from oil to electric lighting. As a matter of fact, there is every evidence that electric road rollers would be less costly than the types they would supersede, and give more satisfactory results in every sense.

## Anderson Electric Advances Prices

The Anderson Electric Car Company, manufacturers of Detroit Electric automobiles, announces that the price of all new Detroit electric models were advanced $100 each on April 8.

The enormous advance in the cost of materials entering into the construction of these cars and the great care and skill employed in the coach work has added so materially to the cost of the car that the factory has found it necessary to make this price announcement.

The Anderson Electric Car Company of Detroit is the largest manufacturer of inclosed cars in the United States. While large quantities of material were contracted for in making plans for the 1916 output it was impossible to engage for a sufficient amount to escape the burden imposed by the rapid increases in the cost of raw material.

Sixty-one Detroit electrics were sold through the Chicago branch in the month of February. That is conclusive evidence that the public is satisfied that electric power is economical, and that the electric car is just what is needed to make for economical and luxurious transportation

## Central Stations to Sell Lansden Electrics

The Lansden Company, of Brooklyn, one of the oldest names known in the commercial electric vehicle field, has recently inaugurated a most interesting selling plan in connection with its electric trucks for central stations throughout the country.

Among other features of this campaign the above company places a demonstrating car with the central station company and co-operates with it, both in its demonstrations and in the helping of the closing of the business which develops. This company also arranges for a deferred payment plan, where necessary, to run over a period of a year, details concerning which are clearly outlined in the proposition to central stations. The battery equipment may be handled in a like manner or on a rental basis if preferred.

The scheme of presenting the central stations with a demonstration car is also a part of the plan which is already meeting with such success.

F. S. Komp, general manager of the company, would be pleased to go into further details concerning this plan with any central station manager who will write him on the subject.

## Milwaukee Safety Commission Elects

Chief of Police John T. Janssen, Milwaukee, Wis., has been elected president of the Milwaukee Public Safety Commission at the third annual meeting. Gen. Otto H. Falk, who served two terms as president, consented to take the first vice-presidency. Other officers are: Second vice-president, Prof. Leo Tiefenthaler, municipal reference librarian; secretary, R. L. Frost, assistant secretary, Merchants and Manufacturers' Association; treasurer, Charles W. Lamb, safety division, Milwaukee Electric Railway & Light Co. The commission has accomplished remarkable work in the direction of minimizing traffic accidents.

# Automobile Motor Characteristics

*Delivered Before the Chicago Joint Meeting of the E. V. A., A. I. E. E. and W. S. E.*

BY FRANK A. PUTT

THE success of the battery propelled vehicle of today is due in a very large measure to the highly specialized motor which is the result of a great deal of attention in the past few years, and which represents the highest development in direct current design.

The automobile motor must be designed with the proper characteristics to suit the supply of current, because storage batteries and their characteristics call for the maximum efficiency in the use of current at all times and under all conditions. They must also be designed to meet the conditions under which they are to operate from a mechanical standpoint, which demands great strength and durability combined with accessibility and light weight. These have compelled the automobile engineer to use his highest skill in the selection and use of materials. As a result, we find the motor of today very light and compact and yet very efficient as to the use of electric current. It is obvious to all that the lighter the motor for a given output and efficiency, the more desirable for use where the storage battery is the source of supply.

The standard motors are now wound for 80 to 85 volts for use with the lead battery and 60 volts for use with the Edison battery, for standard passenger car and automobile truck. However, for light cars, industrial trucks and special applications, voltages of 48, 36 and 24 are sometimes required. The higher voltages, of course, are recommended, since efficient charging is facilitated. In order to provide for satisfactory and efficient operation, each motor frame has two standard ratings, one based on 85 and the other on 60 volts, the current in each case being such that the total wattage input and speed are approximately the same. This allows the motor weight for each type of battery for normal operating conditions to be approximately the same. Within certain limits, the current and speed rating can be varied to suit special conditions. However, a radical change might require different windings.

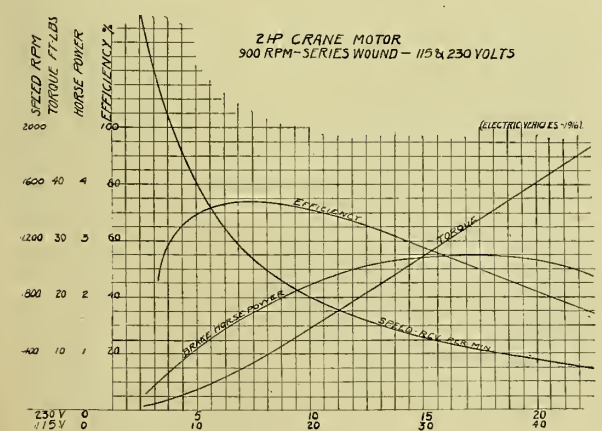



*Figure 1, Showing Curves of Two Horse Power Crane Motor and Easy Torque Characteristic.*

The motors of the present time are designed for speeds ranging from 800 to 1,700 revolutions—the speed of the motor being determined by the type of drive employed and by the gear ratio selected.

The capacity of these motors is based on continuous operation at full load, with a maximum temperature rise of 65 degrees Centigrade, and, at two and a half times load for one hour with a maximum rise of 75 degrees Centigrade, taken at the hottest part of the motor, above the temperatures of the surrounding air.

I have been asked to point out wherein the characteristics of the automobile motor differ from those of the crane or hoist series wound motor. As a result of long experience, automobile motors are usually designed for low saturation particularly for commercial vehicles where the service is severe, with many starts and stops and also frequent grades, permits a steep torque characteristic giving high torque or pull per ampere, thus conserving the battery when heavy currents are required.

As a general statement, five times the normal load torque is required for accelerating, and for a grade of 7 per cent, and if this can be obtained by a steep torque curve, the current draw on the battery will be about two and one-half times normal load current. Motors having a torque ratio of 5:1 are desirable for truck service where extreme loads, heavy roads or steep grades are encountered.

More highly saturated motors are being specified for passenger cars, owing to the demand for higher speeds on the hills—the service being less severe, the results secured in this way are satisfactory.

As a contrast to this, I will call your attention to Fig. 1, showing a characteristic of a recently designed series wound standard crane or hoist motor. From this curve you will observe that the torque at full load as compared with the torque at two and a half times full load is approximately three and a half times full load torque. The crane motor is operated at a higher tooth density under normal conditions, although it might also be designed with low density where exceptional overload torque is required.

The field coils are usually combined in pairs for series parallel connection. Curves of an automobile motor have been made from recent road tests and shows in an interesting way the effects of operating an electric truck on various grades with the field coils in series parallel as compared with series connection. It will readily be seen that the series parallel point is more desirable for grades above 1 per cent—the reason being that the field resistance is reduced with the lower $I^2R$ losses, giving a higher total motor efficiency. This results in a higher speed on grade and reduces the length of time the battery is discharging at the high rate.

A typical characteristic curve of a motor for electric passenger car is shown in Fig. 2. This illustrates the difference between the characteristics when the fields are connected in series and in series parallel as was also shown in the preceding cut.

As will be observed, the efficiency with the parallel connection, two coils in series, two sets in parallel, in which the total over-all resistance is reduced is greater than that where we have the series connection with a much higher resistance of the series field, a 4 pole design having four coils connected in series.

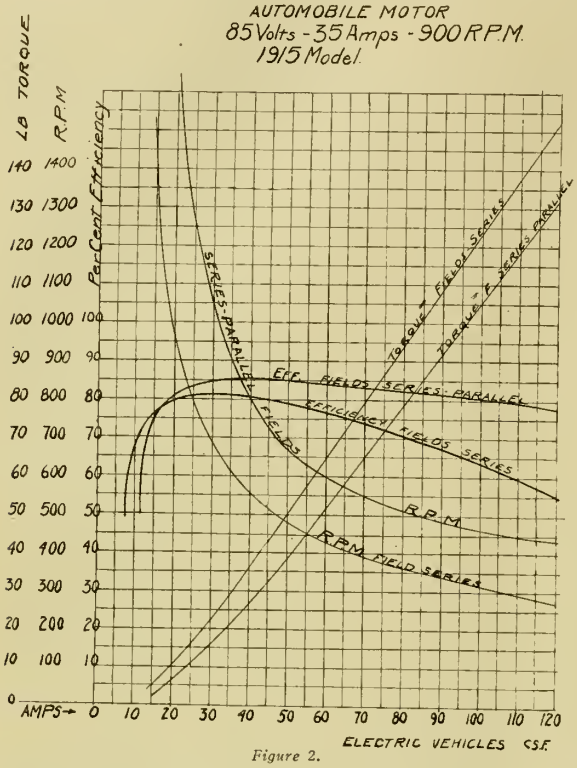



*Figure 2.*

It is also desirable in automobile motor designs to have the lowest possible brush density without undue increase in weight—this drop becoming a factor also on extreme overloads. On voltages up to 60 it has been found advisable to use in some cases special low resistance brushes where the electrical design will permit.

For any size of frame ratings can be developed for any voltage required, so long as the output and speed are not increased. This change affects the armature windings in that on the low voltage, the number of turns are reduced and the copper is increased for the high current. This same condition applies to the field coils, the result being that the same efficiency obtains on motors of different voltages. An increase in speed for a given size frame will increase the horsepower output and a corresponding decrease in speed will reduce the horsepower output.

In all automobile motor designs, while meeting the characteristics which have been indicated, it is also advisable to keep the weights as low as possible. For this reason the motor is compactly constructed and limits maintained, so that minimum clearances can be observed.

The standard motors have cast iron heads, fitted with the most improved annular bearings, which somewhat increase the efficiency and decreases the overall length of frame and require only occasional lubrication. All electrical factors are liberal, permitting these motors to run at high overloads for a considerable period of time without injury. The commutators are composed of a large number of bars, and observations covering several years' use of motors in service indicate that commutation is practically perfect. The greatest care has been taken to secure this result, which has been obtained without the use of interpole or commutating poles; thus keeping down the weight. The windings of the motors are thoroughly impregnated and baked, rendering them impervious to moisture, and also to facilitate the conduction of heat. The motors are also constructed that they are waterproof since in the majority of installations, the machinery is placed under the car, where it is exposed to moisture.

All motors are constructed so that the shaft can be removed without disturbing the commutator or windings. This feature affords great flexibility and permits a change of shaft at small expense to accommodate special conditions or when worn. Copper is used liberally in the design of the motor to keep down the $I^2R$ losses.

A very rigid inspection is maintained during the process of manufacturing the various parts, and in every case, after assembly, the motor is given a final complete inspection, and then an electrical test, sufficient to insure that the machine is completely free from electrical defect. A careful record is made of the speed and current readings taken during the running test.

From the foregoing discussion it should be evident to all that consideration has been given to all the vital factors which go to determine the design of an automobile motor, combining maximum efficiency with the greatest mechanical strength.


## Will the High Cost of Gasoline Hit You?

FROM— K.C. STAR MARCH 9

**HIGH GAS HITS CAR SALES**

BUYERS ARE WAITING AND SOME OWNERS STORE THEIR MOTORS.

New York, March 9—With gasoline retailing at from twenty seven to thirty cents a gallon New York motorists are storing their cars or economizing on fuel, according to the statements of garage owners today. If the wholesale price mounts to forty cents a gallon, as the motor people believe it will, thousands of pleasure and business cars will go into temporary retirement.

The effects of the increase have been felt keenly, even at Ardsley garages where blue book standing is necessary to obtain accommodations. Wealthy Fifth Avenue car owners are buying their gasoline at wayside stations to save three cents a gallon.

MANY CARS IN STORAGE

It was said today a number have even given up their motors for the time being. Ten per cent of the middle class owners have put their machines away pending a decline in gasoline prices, it was stated.

According to the Standard Oil Company gasoline prices may go as high as thirty cents wholesale eventually, but no immediate increases are planned.

Many prospective buyers of pleasure cars are expected to defer their purchases until the price of gasoline recedes, according to leading automobile dealers today.

If you are thinking of buying an automobile, then the first thing to consider is what it will cost you to run. Is its upkeep cost going to be too big a burden? For after all the *real price* of any automobile is not what it costs to get but *what it costs to keep.*

Today one thing is certain—the price of gasoline is on the rise and the cost of electricity is on the wane. And in the years to come the price of electricity will probably go even still lower. You have no assurance that gasoline will become less.

Right now owners of electric cars—men who have driven other types of automobiles—say they find their operative cost 30% to 50% less. Cost of current for battery charging averages only $5 to $7 per month—and this is being reduced.

And, the modern electric will carry you 80 to 90 miles on a single charge. 98% of all trips are well within its mileage range.

In other ways, too, is the modern electric-powered automobile the most economical car. For instance tires last longer—in some cases twice as long—as on other types of automobiles. So simple is the mechanism of an electric car—so strongly and staunchly is it built—that repairs, replacements and adjustments are items of rare occurrence. In these particulars the owner of an electric car saves 60% to 80%. Before you make any decision—in your own best interests—investigate the modern electric car.

**Signature Here**


*This is some of the advertising which the Anderson Electric Car Company of Detroit is getting out for small Central Station plants to use. It does not mention the company's car in any manner but boosts the electric motor car, irrespective of make. Electros are furnished on request.*

# Motor Cars In U. S. Government Service

*Electrics Lighten the Load of the Departments*

WITH the United States ranking as the leading motoring nation, with more than three times as many automobiles running over its 2,273,000 miles of public roads as are used throughout the rest of the world, it is only natural that the federal government should be rapidly converted into a motor vehicle user. The transportation service of the various government departments of Uncle Sam, as far as is possible, is fast being motorized, says *The Horseless Age*.

The White House has in use six motor machines; the Interior Department, in its various branches, seventy-three; the Department of Agriculture, sixteen; the Department of Labor, two; the Treasury Department, seven; the State Department, two; the War Department, ninety-one; the Postoffice Department, 225; the Commerce Department, four; the Government Printing Office, one of which, a Baker Electric, is shown in the accompanying cut, ten; the District of Columbia, thirty, and the Navy Department, sixty-five, or a total of 531.

These figures, even, do not represent the extent to which motor vehicles are used by the government, as in several instances rented cars are pressed into service. This is true as to the customs and the postal services in New York city. As a result of trouble which the Postoffice Department has had recently with the motor contract service in New York city, it is probable that the government will purchase at least 100 additional cars for that service, bringing the total up to 631. The department also has under rental about 100 cars in various other large cities.

New cars, such as the Waverley shown, which is in service at Indianapolis office, are also being bought for other postoffices and the rural free delivery service is being motorized as rapidly as possible. More than 700 rural routes have already been motorized, and by the time this action is taken with respect to all of those which are to be operated by automobile, the number will have reached the thousands for this branch of the service alone. These rural free delivery automobiles, however, will be owned by the individual carriers; but, while privately owned, will stand as a testimonial to the recognition by this branch of the Federal service of the utility of the motor car.

The White House garage contains four passenger cars, one electric runabout, and one baggage wagon. The Interior Department's equipment consists of two large gasolene trucks and two electric trucks, in use in Washington; three freight trucks and one automobile bus, used by the Indian Bureau; four trucks in the field service of the Geological Survey, three trucks used by the Bureau of Mines at Pittsburgh, and fifty-eight cars, practically all of them passenger cars, in the field work of the reclamation service. The Department of Agriculture uses its motor vehicles in the extensive field service it finds necessary.

The Department of Labor uses one truck and one touring car at Washington; the Treasury Department, seven trucks for freight purposes at Washington; the War Department, its motor trucks, passenger cars and motor ambulances at Washington at the various posts and barracks and other military stations; the Post Office Department, its screened automobile and collection and delivery services at Washington and elsewhere among the larger post offices; the Commerce Department, its trucks at Washington; the Government Printing Office, its two electric carriages and eight delivery wagons at Washington, and all of those owned by the District of Columbia, principally for freight and transfer purposes, at Washington.

The Navy Department has in use in Washington and at the various navy yards and other stations throughout the country and the territories under control of the United States, sixty or more machines. Of these about fifty are trucks, used for the heavier hauling, eight or ten are ambulances and the others passenger cars. At the Navy Department it is stated that the motor cars are fully as satisfactory as to results as was anticipated. The cost figures show that they are operated much cheaper than were the horse-drawn vehicles.

The Baker truck shown has the fully enclosed chain drive which is worthy of notice.




*Waverley Parcel Post Car at Indianapolis.*




*3½-Ton Baker Truck in Government Printing Office.*

## General Vehicle Company Reports Good Business

The General Vehicle Company reports that beginning with January 4 the sales of G. V. electric trucks have been more satisfactory than at any time in the past two years. This company always has a large re-order business but this year sales to present users have reached unexpected proportions and, better still, the number of new customers added is without precedent.

Among the re-orders received are 20 more 3½-ton American Express trucks for Boston, 25 more 2-ton American Express for New York, giving them over 150; seven more for Anheuser-Busch Brewing Association at Chicago, making 44 for them in four cities; 10 more 5-ton trucks for Jacob Ruppert, giving this brewer approximately 160 G. V. trucks; 20 more 2-ton trucks for Adams Express Company, which swells its total to over 200 G. V. electriccs; 10 more freight trucks for the Mallory Steamship Company, and smaller re-orders from Milwaukee Railway and Light Company, Capitol Milling Company, Los Angeles; H. J. Heinz Company, J. & J. Slater (shoes), Cady Lumber Company, St. Paul & Tacoma Lumber Company (lumber tractors), National Lead Company, Empire State Dairy Company, Burton-Furber Coal Company and many others.

Hutzler Brothers of Baltimore bought four more worm drive delivery wagons and Bullock's store in Los Angeles others of this type. The Lincoln Safe Deposit Company has added another 3½-ton van, which sale is interesting inasmuch as it has purchased one of these vans each year for seven years without a break.

Among the new G. V. customers are the following: Bank of the Metropolis, New York; Aetna Brewing Company of Hartford, the first brewery truck to go under the local battery service system; J. L. Mott Iron Works, Chase & Sanborn, Boston, a worm drive special delivery tea and coffee wagon; the Carborundum Company, Niagara Falls; Nobscot Spring Water Company, Boston; Arlington Company, of Arlington, N. J.; C. J. Lincoln Company, Hartford; Emery-Beers Company, H. Kohn, Inc., Dayton Engineering Laboratories, and many others.

Rapid progress is being made in the introduction of G. V. electrics among the municipalities. The New York street cleaning department has purchased two 2-ton platform and stake trucks for general utility purposes, thus supplementing their two 5-ton electric garbage tractors and their 12 7½-ton gas electric tractors. Another G. V. electric is used by the department of water supply, gas and electricity.

A most interesting order, however, is the one for six 3½-ton G. V. electric sprinklers for the city of Boston. The introductory G. V. electric in Boston city service was a worm driven G. V. patrol wagon, a duplicate of which was recently ordered.

## Seattle Motor Car Show

Opening day being April 15, fifty cars formed a display at Seattle's third annual motor car show held in the arena. Many Canadian cities were represented adong the visitors.

## Detroits at Aurora, Illinois

A. C. Berthold, owner of the Downer Place Garage, has handled the Detroit Electric in Aurora, Ill., for the past three years. One year ago he secured the services of Karl Wettstein, of Elgin, as exclusive Detroit Electric representative.

## Gigantic Lamp Manufacturers Combine

Formation of the Edmunds & Jones corporation, through the consolidation of the Edmunds & Jones Manufacturing Company of Detroit, the Canadian Lamp and Stamping Company of Ford City, Ont., and the Chicago Electric Manufacturing Company, was announced today. The combine is described as the largest manufacturer of automobile lamps—electric, acetylene and oil.

The new corporation has $1,000,000 7 per cent preferred stock and 40,000 shares of common stock of no par value. The stock has all been sold by the banking firms which underwrote the merger, the preferred having been placed at $97 and the common at $30 a share. The common, it is said, has advanced to $42 since the subscription books were closed. Hornblower & Weeks and Merrill, Lynch & Co. were interested in the underwriting and a considerable amount of stock was sold in the west.

A circular issued by the bankers says:

"The Edmunds & Jones Manufacturing Company is the largest manufacturer of electric, acetylene and oil lamps for pleasure cars and motor trucks in the United States. One of the corporation's subsidiaries, the Canadian Lamp and Stamping Company, occupies a similar position in Canada, and the other subsidiary, the Chicago Electric Manufacturing Company, is the largest American manufacturer of connectors, sockets and other important integral lamp parts.

"Over 50 per cent of all the automobiles manufactured in the United States during the last three years have been equipped with E. & J. lamps. Sales have increased from 442,646 lamps in 1913 to 1,467,119 lamps in 1915. January and February sales were more than 100 per cent ahead of the same period last year."

In 1915 the three companies, it is stated, earned $400,000 net. The consolidated corporation begins business with no bonded or floating debt and with $208,075 of cash on hand.

## General Motors Prosperous

For 7½ months of its fiscal year, the period from August 1, 1915, to March 15, 1916, the General Motors Company showed gross receipts from all sources of $87,800,000 as compared with $46,500,000 for the corresponding period of the year before. This indicates a gain of $41,300,000, or an increase in gross business of 88.8 per cent.

On this basis and assuming that there will be no further increase, the gross income at the end of the fiscal year, July 31, would exceed $135,000,000. On the other hand, if the ratio of increase is maintained the amount would be phenomenal, especially in view of the fact that this company five years ago was doing about $42,000,000 of gross business.

It has been stated on semi-official authority that the net earnings of General Motors this year would reach about $24,000,000, or more than 150 per cent on the common. The company's stock is one of the sensations of the market, its earnings approximating closely to those of the common stock of the Bethlehem Steel Corporation.

W. L. Day, who has been vice-president and general manager of the General Motors Truck Company, has become president and general manager. W. K. Chilcot Shaw, who is treasurer of the General Motors Company, has been elected treasurer of the truck company also.

# Standardization of Tire Fabric Testing

*By Walter S. Lewis and Charles J. Cleary of the Bureau of Standards, Washington, D. C.*

THE manufacture of automobile tires has become, with the increase in the use of motor vehicles, an industry of very considerable importance in the United States. American manufacturers not only supply almost all of the domestic demand, but also export large quantities to foreign countries. It therefore becomes very desirable, from the point of view both of the manufacturer and of the consumer, to provide the former with whatever information he requires to enable him to produce a serviceable article. The fundamental strength of the tire is provided by the several layers of cotton fabric used as the framework of the tire structure.

The cloth referred to in this paper is that known as 17¼ ounce per square yard builder fabric. This necessitates the procuring of an exceptionally good grade of fabric and the interests of the tire manufacturer demand that the strength be as high as practicable.

In order to enable the tire manufacturer to procure suitable fabric, specifications have been drawn up stating among other things, the minimum strength that will be considered as answering the demands of the case. The differences which have existed in methods of testing have, however, given rise to some confusion in interpreting these specifications, i. e., serious differences have occurred in the results of tests obtained by different testers. The Bureau of Standards has therefore undertaken, in co-operation with certain fabric and tire manufacturers, to determine the methods of test most suitable for these fabrics, with the view to bringing about the adoption of uniform methods.

In making tests like these for comparative purposes, the method admitting the least variation may be assumed to be best. The chief causes of variation in test results are due to different testing machines, dimensions of test specimens, moisture content of specimen at time of test, method of sampling, and lack of uniformity in the material.

Of these, the first will not be considered at the present, but the results of a preliminary investigation will be appended.

It is the purpose of this investigation to determine which of the several proposed dimensions of test specimens, moisture conditions, and methods of sampling may be expected to give the most consistent and therefore the most reliable results.

By taking the average of a long series of tests by several experimenters using the same fabric, other variable elements may be considered as equalized, i. e., results are comparable and the method showing the most uniformity may be considered the best to adopt.

In comparing different dimensions of test specimens, those marked A, B, and C, Fig. 1, were investigated. These three were selected because they were more generally employed and seemed the most practicable. All five forms of test specimens, however, are in common use in testing laboratories.

Each series of tests was made upon tire fabrics weighing approximately 17¼ ounces per square yard and the highest grade of cotton fiber was employed in manufacture. This fiber also received the best of care throughout the various processes of producing yarn and fabric so that the finished cloth should show a high degree of uniformity.

The test specimens were prepared from samples that were selected in such a way as to give, as nearly as possible, identical specimens to the various testers. In this manner the variation in the materials was reduced to a minimum.

All fabrics were supposed to contain 23 threads per inch in warp and in filling; therefore, in test specimens A and B the width was actually determined by

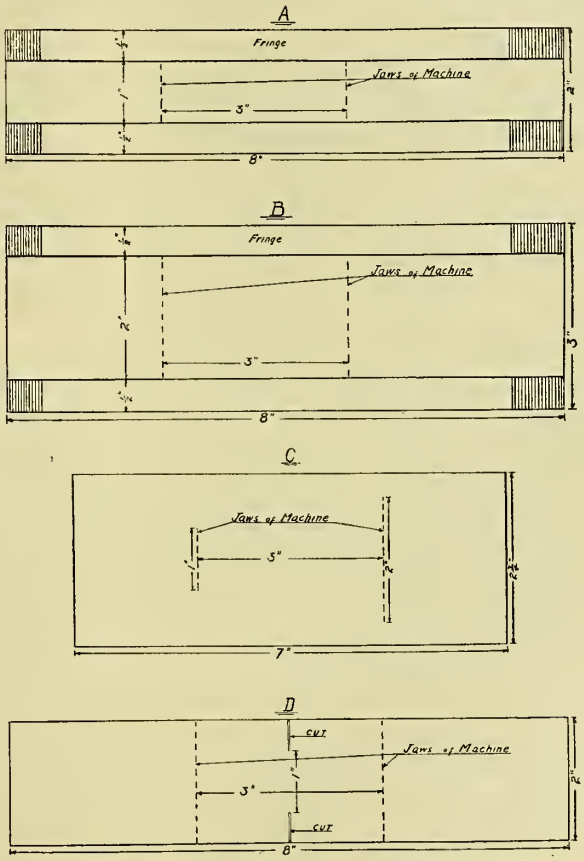



*Fig. 1.—Tensile Strength Test Specimens.*

counting 23 and 46 threads, respectively. The adoption of this method of preparing test specimens was to lessen the variation in the material caused by irregularities and slight departures from the standard number of threads. This procedure could not be followed for C test specimens as they were not raveled to a certain number of threads.

Table 1 is a fair average illustration of the variation in the results found for breaking stresses.

Each of the figures in Table 2 represents averages of long series of tests upon different fabrics. More than 2000 test results have been used in making this table. Deviations were figured by comparing the

TABLE 1.
Tensile Strength Results of Tests Upon "A" Test Specimens.

| Samples of fabric | Tensile strength Pounds | Percentage deviation from mean tensile strength | Samples of fabric | Tensile strength Pounds | Percentage deviation from mean tensile strength |
|---|---|---|---|---|---|
| 1 | 251 | 1.62 | 6 | 242 | 2.02 |
| | 253 | 2.43 | | 245 | .81 |
| | 256 | 3.64 | | 260 | 5.25 |
| 2 | 251 | 1.62 | 7 | 249 | .81 |
| | 253 | 2.43 | | 245 | .81 |
| | 249 | .81 | | 247 | .00 |
| 3 | 245 | .81 | 8 | 253 | 2.43 |
| | 240 | 2.84 | | 247 | .00 |
| | 249 | .81 | | 242 | 2.02 |
| 4 | 245 | .81 | 9 | 241 | 2.43 |
| | 251 | 1.62 | | 250 | 1.22 |
| | 251 | 1.62 | | 253 | 2.43 |
| 5 | 249 | .81 | 10 | 245 | .81 |
| | 242 | 2.02 | | 249 | .81 |
| | 249 | .81 | | 252 | 2.02 |
| | | | Mean of 30 tests | 247 | 1.61 |

results of individual tests upon one sample with the average of these tests. The average of the deviations thus found was taken to be the average deviation of the sample using a certain method of testing. The results obtained from tests upon several different samples of fabric were then averaged, giving the mean percentage deviation for the method.

TABLE 2.
Tensile strength and percentage deviations.

| Tests made by | Fabric manufactured by mill. | A test specimens Pounds | A Percentage deviation | B test specimens Pounds | B Percentage deviation | C test specimens Pounds | C Percentage deviation |
|---|---|---|---|---|---|---|---|
| Bureau of Standards | No. 1... | 230 | 2.03 | 426 | 3.56 | ... | .... |
| | No. 2... | 224 | 2.22 | 433 | 3.18 | ... | .... |
| | No. 3... | 217 | 3.43 | 428 | 3.42 | ... | .... |
| | No. 4... | 226 | 2.80 | 423 | 3.10 | ... | .... |
| Mill No. 1 | No. 1... | 214 | 3.44 | 416 | 4.13 | ... | .... |
| | No. 2... | 203 | 4.77 | 383 | 3.91 | ... | .... |
| | No. 3... | 194 | 4.89 | 381 | 4.51 | ... | .... |
| | No. 4... | 205 | 3.78 | 400 | 4.65 | ... | .... |
| Mill No. 2 | No. 2... | 229 | 0.88 | 428 | 0.96 | 321 | 0.72 |
| Mill No. 3 | No. 3... | 243 | 2.90 | 479 | 2.69 | 357 | 2.20 |
| Mill No. 4 | No. 4... | 259 | 1.34 | 491 | 1.74 | 388 | 1.40 |

The results given in Table 2 were obtained from tests made upon dry test specimens (dried at 105° C), and five machines of four different makes were employed. These five machines were in laboratories located in different parts of the United States, viz, three in the North, one in the Middle Atlantic States, and one in the South.

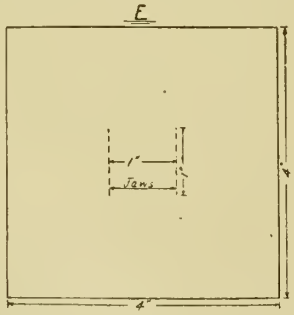



Fig. 1. (Continued)

These results show that there is very little difference between the 1-inch (A) and 2-inch strip (B) methods (Fig. 1), whatever preference there is being in favor of the former. The fact that the former method requires less material, is easier to apply, and admits of the use of a testing machine of smaller capacity indicates that preference should be given to it. Regarding method C the percentage deviations compare very favorable with method A, but this method has several weak points, which will be briefly described:

(*a*) In making tests according to the A and B methods breaks occurring at the jaws are discarded, as they may have been caused by the crushing or shearing of the material by excessive tightening of the grips. Where method C is used, it is not possible to distinguish between breaks which may have occurred on account of excessive tightening of the grips and such

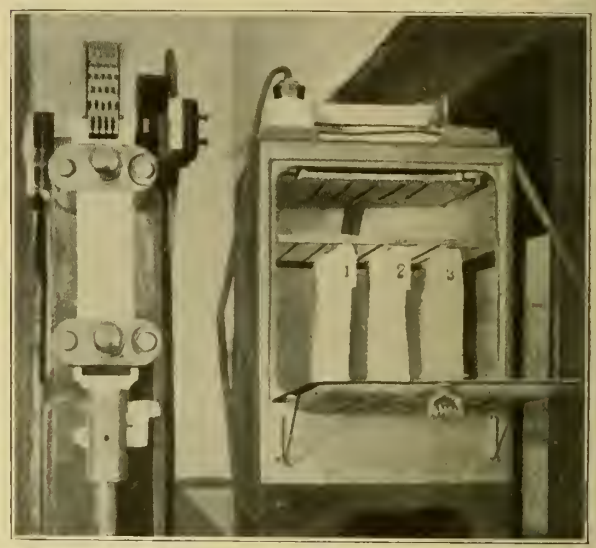


Fig. 2.—Testing Machine and Humidor.

breaks which were not influenced by such tightening, the shape of the test piece in this case causing the break always to occur at the 1-inch grip.

(*b*) The breaking stress obtained is a function of the lateral stiffness of the fabric, as well as the strength of the material. In other words, the test result is always influenced by yarns outside the 1-inch width under direct tension, and this influence is not constant in all fabrics.

(*c*) Great care is also required in placing these test specimens in the jaws of the testing machine. A specimen fastened at a slight angle in the jaws will cause a large difference in tensile strength from that which would occur if it was placed in properly. The latter series of tests was, however, rather inconclusive, owing to the relatively small number of tests made.

The fact that the three methods of tests were employed by persons already familiar with the application of one particular method of test furthermore tended to considerably reduce the variation as compared with the other two methods, which had not in some cases been used at all until this series of comparative tests was started.

From the results of preliminary tests it appears that the A method is fully as satisfactory from the point of view of accuracy and reliability as the others; this, however, will be substantiated by further tests.

The following results in Table 3 show the relation of tensile strength of fabric tested by five different methods. These, based upon several hundred tests in each case, were obtained from tests made upon test specimens prepared as shown in A, B, C, D, E, Fig. 1.

In considering the element of moisture content of the specimen several points must be kept in mind. Samples of cotton material have been found to increase in strength very materially when they are caused to

absorb moisture from the atmosphere. It, therefore, is necessary to adopt standard conditions in order to make and two tests comparable. This may be done either by drying the sample in such a way as to eliminate the question entirely or to expose samples to a previously accepted standard atmosphere until they shall have absorbed all the moisture they will and the samples and atmosphere will be in equilibrium. It has been assumed that the elimination of the possibility of difference in moisture content between samples rendered the former method more reliable.

TABLE 3.

| Comparing specimens prepared as shown in the diagrams, Fig. 1. | Approximate percentage increase or decrease of tensile strength employing test specimen A as basis of calculation. |
|---|---|
| A ..... | B test specimens are approximately 90 per cent stronger than A test specimens. |
| B ..... | |
| A ..... | C test specimens are approximately 45 per cent stronger than A test specimens. |
| C ..... | |
| A ..... | D test specimens are approximately 25 per cent weaker than A test specimens. |
| D ..... | |
| A ..... | E test specimens are from 15 to 30 per cent stronger than A test specimens. This varies with warp and filling. |
| E ..... | |

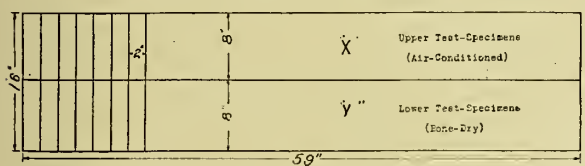



*Fig. 3.—Method of Cutting Samples From Fabric.*

Samples for this test were cut as shown in Fig. 3, the test specimen A, Fig. 1, being used in all cases. The upper or X specimens were exposed in an atmosphere of 65 per cent relative humidity and 21° C (70° F) temperature for several hours and tested. The lower or Y specimens were placed in an oven, Fig. 2, in which a temperature of 105° C (221° F) was continuously maintained. After exposing for about two hours or until all uncombined moisture of the fiber is eliminated the specimens were removed, one at a time, and tested as quickly as possible. In each case the test specimen was broken within 30 seconds after being taken from the oven, and there is reason to believe that the amount of moisture absorbed before the completion of each test was entirely negligible.

In preparing the specimens, the samples were raveled down to their final width (along the 16-inch length) before separating the X and Y parts. This procedure insured exactly the same threads being tested by each method. The individual results were tabulated and deviations calculated from the average as shown in Table 4.

The following table is given to illustrate the method for ascertaining which condition (air conditioned or bone-dry) gives the more uniform results upon test specimens of identical dimensions:

From four series of tests made in different mills using this method the average deviations were calculated. The results appear in Table 5 and comprise several hundred tests in each series.

An analysis of Table 5 shows that, in general, the contention that bone-dry samples would give more uniform test results, owing to lack of uneven moisture distribution, has been sustained. For this reason this method has been tentatively accepted for tire fabric testing.

In comparing the different methods of sampling, it was simply designed to show that, in general, similar results would be obtained, no matter how samples were taken. Table 6 gives the averages obtained on samples located as shown in Fig. 4. A large number of samples were taken from which to compute each average.

TABLE 4.

| X Air-conditioned test specimens (65 per cent relative humidity at 70° F.) | | Y Bone-dry test specimens (dried at 105° C). | | X Air-conditioned test specimens (65 per cent relative humidity at 70° F). | | Y Bone-dry test specimens (dried at 105° C). | |
|---|---|---|---|---|---|---|---|
| Warp Pounds | Percent. deviation | Warp Pounds | Percent. deviation | Warp Pounds | Percent. deviation | Warp Pounds | Percent. deviation |
| 306 | 2.00 | 219 | 0.45 | 292 | 2.67 | 219 | 0.45 |
| 312 | 4.00 | 221 | .45 | 291 | 2.00 | 218 | .91 |
| 310 | 3.33 | 221 | .45 | 300 | .00 | 220 | .00 |
| 304 | 1.33 | 218 | .91 | 302 | .67 | 221 | .45 |
| 299 | .33 | 220 | .00 | 296 | 1.33 | 220 | .00 |
| 308 | 2.67 | 221 | .45 | 300 | .00 | 223 | 1.36 |
| 310 | 3.33 | 218 | .91 | 304 | 1.33 | 218 | .91 |
| 312 | 4.00 | 221 | .45 | 295 | 1.67 | 217 | 1.36 |
| 307 | 2.33 | 223 | 1.36 | 299 | .33 | 221 | .45 |
| 291 | 3.00 | 222 | .91 | 296 | 1.33 | 221 | .45 |
| 294 | 2.00 | 225 | 2.27 | 294 | 2.00 | 220 | .00 |
| 289 | 3.67 | 221 | .45 | 295 | 1.67 | 223 | 1.36 |
| 298 | .67 | 217 | 1.36 | 293 | 2.33 | 220 | .00 |
| 301 | .33 | 216 | 1.82 | 298 | .67 | 219 | .45 |
| 294 | 2.00 | 221 | .45 | —— | —— | —— | —— |
| 301 | .33 | 222 | .91 | Av. 300 | 1.81 | 220 | .73 |

TABLE 5.

Comparative Tensile Strength Tests Upon Specimens Under Two Different Conditions.

| Series of tests— | X samples Air-conditioned test specimens Pounds | Percent. deviation | Y samples Bone-dry test specimens Pounds | Percent. deviation |
|---|---|---|---|---|
| No. 1 | 300 | 1.98 | 220 | 1.21 |
| No. 2 | 306 | 2.16 | 213 | 1.10 |
| No. 3 | 289 | 1.38 | 192 | 1.03 |
| No. 4 | 303 | 1.66 | 205 | 2.15 |

TABLE 6.

Average Tensile Strength of Different Parts of Fabric

| Tests made by | Test Samples A Pounds | B Pounds | C Pounds | Individual rolls tested of each letter Rolls |
|---|---|---|---|---|
| Bureau of Standards | 214 | 219 | 220 | 51 |
| Mill No. 1 | 196 | 199 | 197 | 89 |
| Mill No. 2 | 217 | 217 | 217 | 12 |
| Mill No. 3 | 234 | 241 | 239 | 10 |
| Mill No. 4 | 262 | 262 | 263 | 14 |
| Total | | | | 176 |

This Bureau's results were obtained from tests upon fabric manufactured by the four mills.

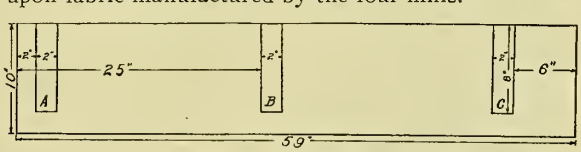



*Fig. 4.—Method of Selecting Tensile Strength Test Specimens.*

The results of these tests show that there are only small differences in tensile strength at any place across the width. By taking test pieces well distributed from selvage to selvage, the weakest and the strongest parts of the fabric would be found and the average of all tests would more fairly represent the strength.

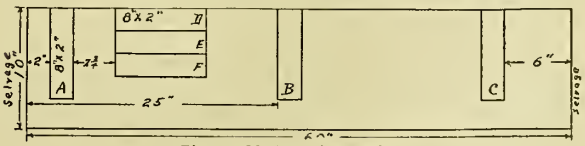



*Fig. 5.—Method of Sampling.*

The contention that the center of the fabric may be stronger than portions near the selvage does not warrant the latter being left out of consideration when the whole fabric is to be used. A method of sampling, both convenient and representative, is shown in Fig. 5 and Fig. 6.

*(To be concluded)*

## American Prima Donna Purchases Electric

Among the stars of the operatic world, personal grace and style has always been one of the greatest elements of success. The operatic star who is blessed with these graces, as well as being gifted with a splendid voice, is assured of a success which soon becomes world wide—and so it is only natural that every action in the private life of a great star meets the approbation and following of the world's elite, whose custom it is to commend or condemn the styles of the day.

No more marked example of the successful and generally admired operatic artist of today can be cited that the young American woman, Edith Mason, who



*Miss Edith Mason and Her Chow Dog.*

has been the sensation of the New York Metropolitan Opera Company during the past season. Her grace, beauty and wonderful voice have brought the music critics of the world to their knees. So strongly has she become enthroned as a leader that today her every action is considered a wise criterion to follow by those of artistic aspirations. When this fact is considered, it is not surprising that The Anderson Electric Car Company points with pride to the recent sale of a Detroit Electric to Miss Mason.

There is no type of automobile, foreign or American, with which Miss Mason is not familiar and which she could not own by merely expressing her wish, but when she desired a car for her own personal use about town and suburbs, she chose an electric. This is indeed a tribute to the excellence of the modern electric car, as embodied in the Detroit.

## Society of Automobile Engineers Make Recommendation

The Electric Vehicle Section of the S. A. E. held a recent meeting for standards on jars for batteries. Aside from members of the Division and the Standards Committee staff, there were present representatives of five of the leading storage-battery manufacturers.

The chief work of the meeting was in regard to dimensions of storage-battery jars, as a preliminary to standardizing dimensions of trays to facilitate the interchange of batteries.

SUGGESTED JAR DIMENSIONS

The work of the meeting was tentative and has not been formally approved by the Division.

The suggested dimensions were as follows:

Heights .....13⅝ in. for high-rib jars
12 7/16 in. for low-rib jars
Width ..... 6⅛ in.
Thickness of walls..... ⅛ in.

No conclusion was reached as to the length, which is a variable depending upon the number and thickness of plates. This problem was discussed at length and plans were formulated for a tabulation of present practice to be submitted to interested parties in an attempt to arrive at a reasonable list of standard lengths.

This tabulation has now been prepared by a member of the Division. It shows forty-five variations in the length between 2 and 2½ in. It is suggested that the list be reduced to twenty-seven lengths with 2¾-in. sediment space and to fifteen lengths with 1¾-in. sediment space.

The Division is thus making real progress toward a standard which promises to be of great value to the electric vehicle industry.

Another matter before the Division is a revision of the present standards for charging receptacles consisting in a lengthening of the sleeve and insulating members.

The Electric Vehicle Division having carried on extensive correspondence with its members and all manufacturers of electric vehicles on the subject of speed and mileage ratings, makes the following recommendations, through their chairman, Arthur J. Slade:

Electric vehicle speed ratings shall be based on continuous operation with one-half load over hard, smooth and level roads or pavements at the actual average battery voltage.

Electric vehicle mileage ratings shall be based on a continuous run at the S. A. E. rated speed with one-half load over hard, smooth and level roads or pavements.

The above recommendation covering speed ratings was submitted previously and approved by the Standards Committee. The recommendation submitted on electric vehicle mileage ratings has been modified materially from that previously submitted and referred back to the Division by the Society. Both definitions are in the simplest possible form but it was found impossible to secure any unanimity of opinion among the vehicle manufacturers.

The 1916 Meetings Committee in charge of the summer cruise of the S. A. E. has already made 147 reservations for members and guests for this outing. The S. S. Noronic has a total accommodation for 550 and with over one-quarter of this taken up in a fortnight after the matter was first placed before the members.

For the convenience of those members taking the cruise arrangements have been made for the Noronic to stop at Sarnia, Ontario, on the return trip, Friday, June 16, so that those desiring to take trains east from this point can do so. Detroit hotels will be crowded the week of the cruise because of other conventions and for the convenience of members taking the trip who cannot secure hotel accommodations, the Northern Navigation Company has agreed to let them stay on the Steamship Friday night. No meals will be served Friday night on the boat.

K. W. Zimmerschied, chairman of the Papers Committee, has already made good progress in formulating the technical program of the meeting. The subjects presented will be of high engineering caliber. Howard Coffin, member of the Naval Consulting Board, will present a paper on Preparedness. J. E. Hale, of the Goodyear Company, will read a paper on Straight-side versus Clincher Type Tires, and E. A. Nelson on pressed steel construction in motor cars.

Editors: ED. J. MOCK, PAUL H. WOODRUFF
Associate Editor, CARLYLE FLIEDNER
Circulation Manager: N. S. STRONGE
CHARLES R. CONDON: New York Representative
New York Office, 1022 Longacre Building
Forty-second St. and Broadway
Telephone Bryant 7030

*This publication is free and independent of all business or house connections or control. No manufacturer or supply dealer, or their stockholders or representatives, have any financial interest in Electric Vehicles or any voice in its management or policy.*

Entered at Chicago Post Office as Second Class Mail Matter

# ELECTRIC VEHICLES

PUBLISHED MONTHLY BY
ELECTRICITY MAGAZINE CORPORATION
Monadnock Building, Chicago
TELEPHONE: HARRISON 3014.

New York Office, 1022 Longacre Building, 42nd Street and Broadway.

Ed. J. Mock and Paul H. Woodruff, Editors

NOTICE TO ADVERTISERS

Changes of advertising copy should reach the office of publication not less than ten days in advance of date of issue. Regular date of issue, first day of each month. New advertisements will be accepted up to within five days of date of issue, but proof of such advertisements cannot be shown in advance of publication.

SUBSCRIPTION PRICE
Per Year $1.50

| | |
|---|---|
| Canada | $1.75 |
| Foreign | 2.00 |
| Single Copy | .15 |

FOR SALE AT ALL NEWS STANDS

NOTICE TO SUBSCRIBERS

REMITTANCES — Remittances should be made by check, New York draft or money order, in favor of ELECTRIC VEHICLES. Foreign subscriptions may be remitted direct by International Postal Money Order.

CHANGE OF ADDRESS—The old address should be given as well as the new, and notice should be received two weeks in advance of the desired change.

If Your News Dealer Will Not Supply You—Please Notify Us

Volume VIII CHICACO, APRIL-MAY 1916 Number 4-5

## The Industry's Most Important Convention

DURING the last E. V. A. convention, at Cleveland in October, 1915, President Lloyd of the National Electric Light Association observed that the meeting could not rise to its opportunity as a disseminator of electric vehicle enthusiasm because those in attendance were already convinced. A large proportion of the convention activities consisted in carrying coals to Newcastle—or, to modernize the simile, sending current to Niagara Falls. The meeting got along beautifully because everybody present agreed on the major premise. The skeptics and doubting Thomases and indifferent folk, who might really have been benefited and persuaded to co-operate, did not attend.

In many years of attendance at various and diversified sorts of trade conventions, we have never seen a more enthusiastic, attentive and serious assembly than the Electric Vehicle Association invariably presented. All being intensely interested in the discussions, a great deal of valuable material became public and the visitors were mutually benefited. This function of co-operation the association performed admirably. But in the making of converts to its cause and the propagation of faith in the electric the association's conventions accomplished little. The association itself, through the continuous work of its executives, has done wonders; but its annual meetings have been attended, naturally enough, only by those already favorable to the electric, who needed no persuasion.

Affiliation with the National Electric Light Association is bound to change that condition. The conventions of the N. E. L. A. are attended by thousands of central station representatives. Surprising as the fact is, a great many of these men, as well as the companies they represent, are not at all interested in the electric vehicle; and some of them are positively prejudiced against it. Probably a substantial proportion of them, despite their devotion to applied electricity, know as little about the actual conditions of the electric as any layman.

These people, expert in all other branches of electrical art, are members of the N. E. L. A. They attend its conventions. The electric vehicle organization, now affiliated with their society, will meet them and exert its direct influence upon them for the first time in the history of the industry.

The central station is one of the fundamentals of the electric vehicle business. The latter, indeed, cannot achieve success without the support of the former. It is to the central station's financial advantage to encourage the use of electrics; and the only reason for such indifference as it has manifested is its multiplicity of other interests.

But now the vehicle interests and the central station interests are brother members of one powerful organization; not merely those who choose to associate, but those who have so far held aloof. So if we recognize the winning of the central station as the paramount undertaking of the electric vehicle industry, this coming convention, dated May 22 to 26 at Chicago, is the most important one ever held. It is the first one in which the great central station organization has assumed responsibility for the propagation of electric vehicle education.

## The Congestion Solution Is in Our Hands

IT is of little avail that the transportation of freight by railroads and steamships in highly efficient. The congestion at terminals not only robs the system of its advantages, but provides a problem apparently more difficult to solve than that of transportation. At least it has not been solved so far. The handling of merchandise inside the terminals, its delivery to and removal from them, all are in a state of confusion almost as chaotic as though no systematic thought had been directed at the condition.

It is suggested by the secretary of the Electric Vehicle Section of the National Electric Light Association that local transportation to and from the terminals, and handling inside the terminals, should be considered as a joint operation and not as two distinct problems. It is obvious that the perfection of a system of intra-terminal handling would afford no relief so long as outside delivery questions remained unanswered. No increase in total efficiency can be anticipated until all merchandise flows uninterruptedly from the already efficient transportation medium to its ultimate destination, and vice versa.

Whatever agency undertakes the task of untangling the web of congestion must naturally work in harmony and understanding with the transportation companies. If existing concerns organized for the handling of local delivery do not take advantage of the opportunity, the railroads will be forced to organize agencies under their control for the work.
work.

The terminal moving of freight as efficiently as express merchandise is moved is only a matter of facilities and system; and such arrangement, far from adding expense, would actually prove an economical measure. It would permit the use of the streets during twenty-four hours of the day, instead of the present eight hours of greatest congestion and lowest efficiency. It would reduce the necessary storage space at terminals, and by increasing the satisfaction of shippers encourage much new business.

Existing express companies are competent to solve the problem if they can be pursuaded to undertake it. The moving of freight by express methods in and out of terminals is a field of activity that promises compensation for the losses occasioned by the parcel post idea.

The materials for solving the terminal congestion puzzle are already at hand. The use of industrial trucks and trains within the terminals in conjunction with electric commercial vehicles for delivery and intra-urban transportation, on a twenty-four hour basis, brings the condition of terminal freight handling from the lowest to the highest efficiency.

Inasmuch as everybody concerned in the situation would be benefited by the change, including the shippers, the transportation companies, the express companies, the electric vehicle industry and the cities, it should not be difficult to secure the co-operation of all parties lookng to the immediate adoption of the plan.

The secretary of the Electric Vehicle Section on another page outlines briefly the advantages and possibilities of his scheme, and we have done little here beyond indicating and emphasizing his argument. The idea, he says is advanced "for whatever value it may have," which we are inclined to believe is a great deal.

We trust the point will be definitely acted upon at the convention.

## Foreign Trade in Electrics

EXPORT business in electric vehicles has heretofore been confined to Great Britain. The reports of United States consuls on motor cars in foreign countries have ignored the electric, for good and sufficient reasons. We might have jumped to the conclusion that a consul did not know what an electric was. But of recent weeks there seems to have been an awakening. The consular reports, whenever they touch upon matters automobilic, not infrequently make it a point to say at least a word or two about the electric. True, most of these reports are purely negative; all they have to say is that there are no electrics in the state they represent. But the mere mention is something gained.

The whole civilized world is now pretty well electrified, and charging current is available in all countries. As a rule roads are better almost anywhere than they are in this country. There is no good reason why the electric should not encircle the globe, in a commercial sense.

Maybe there is more export opportunity in the electric vehicle business than we realize.

# British Electric Vehicle Progress

*New Ideas in Motor Cars from Over Seas*

THE ELECTRIC VEHICLE COMMITTEE

A MEETING of this committee was held on the 18th of February, Mr. A. C. Cramb presiding in the absence, through indisposition, of the chairman, Mr. R. A. Chattock. At the commencement mention was made of the increasing circulation of the quarterly bulletin, also that Mr. Seabrook has had to relinquish, for the time being, the honorary editorship, the work having been temporarily undertaken by the secretary, Mr. F. Ayton.

They had before them favorable figures regarding the increasing circulation of their quarterly bulletin, *The Electric Vehicle,* subscribers being now numbered in all parts of the world.

They had received a letter from the secretary of the Electric Vehicle Association of America, congratulating them on tangible progress.

Some time ago the committee asked the Accumulator Manufacturers' section of the British Electrical and Allied Manufacturers' Association, through their representatives on the committee, to consider the possibility of further standardization of lead-acid accumulators for electric vehicles, particularly in regard to rating and the overall sizes of cells. The committee at this meeting considered a communication from the Accumulator Manufacturers' section of the B. E. A. M. Association, stating that they were prepared to agree to the stanrard sizes and rating as set forth below, which the committee consider satisfactory, and as meeting present requirements. These, as well as other matters in connection with lead-acid accumulators that have, with the co-operation and assistance of the manufacturers, been standardized, will be known as E.V.C. standards, but it is hoped that, in due course, the British Engineering Standards Committee may give them the mark of approval. All sizes given are the maximum sizes, so that the manufacturer may construct battery boxes that any maker's cell of a definite number of plates may be fitted.

*Standard Rating.*—If a battery is specified to have an "E.V.C." standard rating of 180 ampere-hours, it means that the battery will give this capacity when discharged at a continuous rate of 36 amperes for a period of five hours, at the end of which time the voltage per cell shall not have fallen below 1.7 volts.

*Standard Plates.*—Height, 8⅝ in.; width, 5¾ in.; lug centers, 4⅜ in.

*Standard Overall Sizes.*—For all sizes the width of the cell shall be $6\frac{5}{16}$ in., and the overall height, including connector, 14⅞ in. The length of the smallest size, i. e., that with seven plates, shall be $2\frac{7}{16}$ in., with the addition of ⅝ in. for each pair of plates above seven plates.

*Standard Inspection Plug.*—Shall be that which will fit a hole in the cover of the cell 1 inch in diameter.

*Standard Charging Voltage.*—Shall be that which is suitable for charging 44 lead-acid cells, i. e., 85 to 120 volts.

The secretary reported that since October 1 subscriptions and donations amounting to £56 14s. had been received. The committee have again undertaken to award money prizes amounting in all to a sum of £10 at this year's annual parade and inspection of motor vehicles, to be held under the auspices of the Commercial Motor Users' Association.

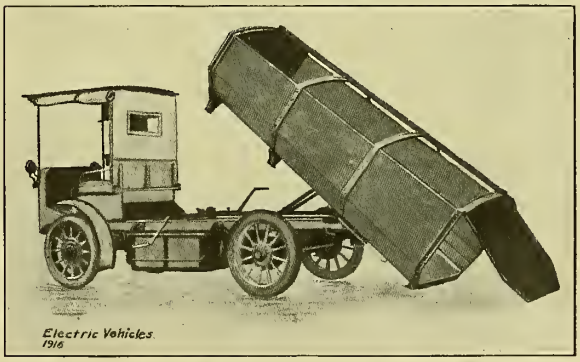
The committee have had brought to their notice difficulties which are being experienced in a few of the districts bordering upon the London area by electric delivery vehicles, operating from London on long delivery routes, in getting boosting charges. The difficulties consist in either delay in getting connected up for charging owing to there being nc permanent connection for the purpose, or, on the other hand, the exorbitant price charged for the service. The committee appeal to all central station engineers to adopt, where they have not already done so, the committee's standard tariff of 1d. per unit for "off peak" charging, with a minimum of 2s. per charge (24 units at 1d.) to include all connecting up and disconnecting.

At first, all that is necessary is a permanent (for the time being) connection from the switchboard bus-bars through a D. P. switch and fuses, or a maximum overload circuit-breaker, through an adjustable water resistance to a British standard charging-plug. If, perchance, there is a booster set, or an exciter in the station, giving about 120 volts, that can be used for this purpose when required, so much the better. The proper and permanent charging plant can be put in when the first car is put into permanent use in the district.

The committee has accepted an invitation by the Society of Motor Manufacturers and Traders to nominate a representative to sit upon the Tire Research Committee, which has recently been appointed to investigate all technical matters concerning rubber tires.

AN ALL-BRITISH COMMERCIAL BATTERY VEHICLE

It has been frequently suggested that excellent openings are presented to British engineers to design and




*Orwell Tipping Refuse Van.*

manufacture in this country electric battery vehicles, both for pleasure and commercial purposes. It is with pleasure we note that Messrs. Ransomes, Sims & Jeffries, Ltd., of Ipswich, have undertaken the construction of the "Orwell" electric vehicles, the general design of which has been developed by Mr. P. A. Mossay. We understand that a considerable number of vehicles are now going through the company's works at Ipswich, and that orders are steadily coming in.

The vehicle is designed for front-wheel drive, with two motors suitably suspended, and carried on specially designed stub axles which turn with the steering. With this arrangement of driving differential gear is done away

with, and the body of the chassis is left free for the accommodation of the battery. In the Orwell vehicles practically the whole of the electrical gear is at the front of the chassis.

The vehicle is substantially constructed, and is designed for loads from ½ to 4 tons. The illustration shows a 2½-ton tipping wagon which has recently been supplied to Wolverhampton Corporation. This vehicle is provided with a standard Orwell chassis with 112-inch wheel base, being driven by two 2¾ horse power compound-wound motors, driving on the two front wheels through single reduction totally enclosed skew gearing. At a motor speed of 1,300 revolutions per minute the vehicle will travel at the rate of 11 miles per hour on the level. The battery, which is divided into two parts and is underslung amidships, is made up of 40 Ironclad Exide cells giving a range of 35 miles on one charge. The controller, which forms a portion of the dashboard, is made by George Ellison, and is fitted with magnetic blow-outs. It provides five speeds forward and one reserve. The resistance grids are of the cast-iron type, and are mounted immediately below the body of the controller. The controller itself is actuated by combined foot pedal on the floorboard and radial lever mounted above the steering wheel.

The design of the tipping gear is of more than ordinary interest. In the vehicle shown it is arranged for hand operation. For hand operation, the long transverse shaft is placed in bearings attached to the upper side of the main chassis girders, and this shaft has square ends for the receipt of the driving handles. About the center of the shaft is a pinion which engages with a spur wheel attached to a long spindle carried from the spur wheel towards the rear of the vehicle. This shaft is furnished with two square threads, each of different pitch, that at the forward end having three threads to the inch and that at the backward end five threads to the inch. Traveling along each thread are blocks, to each of which are attached two levers which terminate in a knuckle fixed on the under side of the wood body. These levers and the threaded shaft form a triangle which can be made flat or steep according to the position of the blocks on each of the square threads. The net effect of the traverse of the threads by these blocks is to thrust upwards the body of the vehicle, and also to travel backwards the point at which the levers are attached. Suitable side rollers and guides are also fitted to the body to take up the rolling friction. This is an extremely simple and easily maintained form of tipping gear.

The body fitted to the vehicle possesses a number of interesting features. It is wider at the back than at the front, and is also tapered from back to front. The overall length of the vehicle from driver's cab to the tail gate is 16 feet 6 inches. The extreme height as shown in the photograph is 10 feet 4 inches. From the ground to the top of the cab is 8 feet 3 inches. The bottom is set on a 5 per cent grade, so that refuse and other material thrown into the body tends to move towards the back. This movement is accelerated by the jolting of the vehicle when in motion. Water, which also forms a not inconsiderable portion of towns refuse, flows towards the rear of the body, and can drip out at the back quite clear of the chassis and rear axle. By this simple means the chassis is protected against rust which is usually set up when moisture can drip through on to the metal parts. In the standard tipping vehicle the back of the body is no higher than 5 feet 3 inches from the ground, and this height is sufficient to admit of loading operations without the use of a ladder. In the Wolverhampton vehicle the sides are hinged so that they can be raised, and made extra high to accommodate ashes, for the carting of which the vehicle is also employed.

## ELECTRIC BATH CHAIRS

There is no doubt at the present moment a decided boon in things mechanical, which would be of benefit to the considerable number of crippled men in the hospitals here at the present time. These men have done their bit and now must be taken care of. One of the best things seen about hospitals now are the electric bath chairs with which the States are already familiar. These I am told appeared in quite considerable numbers in a very practical form at the far-western coast exhibitions. They were the product of the Electriquette Mfg. of Los Angeles, Cal., U. S. A. Although used for pleasure then, they are now seen of various manufactories design for the convalescences and cripples.



*Mr. C. P. Elieson Demonstrating His New Electric Invalid Bath Chair in London.*

On this side of the water Mr. C. P. Elieson has developed a form of bath chair in which a single ¼-hp. motor is mounted in front and drives the front wheels, some 14 inches in diameter through a worm gear of a 20 to 1 ratio. The battery, which is manufactured by the Elieson Electric Traction Co., Ltd., of No. 85, Newman-street, Oxford Street, London W. who also build the car, is placed under the seat. It is a 40-volt, 20-cell battery of 30 ampere hours capacity which weighs 78 pounds. The vehicle gives a range of 20 miles on a charge with a maximum speed of 5 miles per hour. A controller giving 4 speeds is placed on either the right or left side as desired. The controller handle is easily pushed forward for the forward speeds of the bath chair or pulled back for the reverse. Any movement beyond the zero position sets the band brake which is sufficient to hold the chair on a steep hill. The total weight is roughly 250 pounds.

There are two battery driven bath chairs imported at present, one handled by Messrs. A. W. Gamage, Holborn, London, E. C., which is of Swiss manufacture, the product of Société Anonyme A. Tribelhorn et Cie., Feldbach, Zurich, and an American chair made by the Electric Motor Chair Co. of the Railway Exchange Building, Chicago, Illinois, U. S. A., and imported Messrs. Carter Bros., Ltd., Surgeons Supplies.

The Swiss chair is driven by a quarter horsepower motor mounted below the seat of the chair and driving the offside wheel through spur gears. The battery is also placed below the seat of the chair, and has a capacity of 50 ampere-hours, giving a range of 30 to 40 miles on one charge at a speed of about 5 miles per hour. The controller in this case is attached to the end of the steering pillar, which serves to move from side to side the small leading wheel of the chair. To go forward the controller is pushed to the left; the chair is also fitted with a brake which is operated by a side lever at the left-hand of the occupant of the chair.

A paper on "Petrol, Steam and Electric Vehicles" was read recently by Mr. G. Martin Gamble before the Yorkshire Association of Students of the Institution of Civil Engineers, at Sheffield. The author referred to the increased daily radius of motor as compared with horse transport, pointing out the saving in handling of goods by the use of the latter in preference to the railway for short distances. As regards steam traction, he mentioned that the time taken in raising steam, withdrawing or banking fires and replenishing water tanks was equal to 50 10-hour days a year. Up to the present the steam lorry or truck has had quite a vogue.

The paper contained statistics showing comparative estimated running costs, the figures including standing charges, interest 5 per cent per annum, depreciation and insurance, but not management and establishment charges. Thus a rubber-tired petrol wagon of two tons capacity, on the basis of 40 miles a day would cost 8.7d. per mile run; a 3-ton wagon, 40 M. P. D., 11.2d.; a 4-ton wagon, 40 M. P. D., 11.7d.; a 5-ton wagon, 40 M. P. D., 12.8d. A rubber-tired steam wagon of 3 tons capacity, 35 M. P. D., would cost 10.6d. per mile run; and a 5-ton wagon, 30 M. P. D., would cost 13.9d. As against these figures, the author estimates the cost of operating a 2-ton electric vehicle 30 and 50 miles per day at 10.1d. and 7.8d. per mile run respectively; a 3½-ton vehicle, 45 M. P. D., at 10d.; and a 5-ton vehicle, 35 M. P. D., at 12.8d. per mile run.

Electric vehicle makers' estimates, comparable with the foregoing, show, for a 1½-ton vehicle, 32 M. P. D., 8.8d. per mile run; 2-ton vehicle, 40 M. P. D., 5.7d. and 5.1d. (two makers); 3½-ton vehicle, 40 M. P. D., 7.13d., and 45 M. P. D., 6.69d. (two makers); 5-ton vehicle, 35 M. P. D., 9.5d., and 40 M. P. D., 8.45d. per mile run (two makers). Figures of cost per ton-mile were also given, based on the data given above. The author admits the difficulty of producing really comparative data.

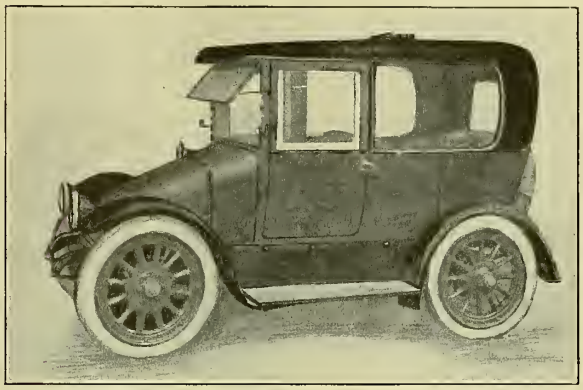
### AN ATTRACTIVE PASSENGER ELECTRIC

A very attractive private battery car has just been built by Messrs. Electromobile (Leeds) Ltd., to the special requirements and order of their Swansea representatives, Messrs. Johnson & Burgess, Ltd. Every refinement of a modern car has been incorporated. The car appears to us to be an advance on American electric car design, both in technical features and in comfortable appurtenances. The difficulty of the design of the forward end has been ingeniously overcome without the use of a dummy radiator which some of our American imports have.

The energy consumption is 3 to 4 ampere-hours per mile, according to surface of road, and at 88 volts this is 264 to 352 watt-hours per mile, or approximately ¼ to ⅓ unit per mile. At 1d. per unit this is equivalent to 3 to 4 miles for 1d., as petrol is selling at two shillings sixpence per gallon the car should have quite a vogue.

The body provides inside drive saloon for four persons, with two swiveling and collapsible seats for driver and his companion. It is painted in Vauxhall brown and black, and the upholstery is in fine beige Bedford cloth. A ventilator is fitted in the roof, and door windows and screen are arranged to open. The upper half of the screen overlaps the lower portion, when closed, to prevent ingress of rain. A small glass trap-door is provided in the screen to give the driver a clear view when the screen is down and the trap open. All windows are beveled plate-glass, and the bonnet and body made of beaten aluminum sheet with invisible joints. All the mudguards are domed. One holophane roof light, and one cast aluminum rear light attached directly to number plate, also two head and two side lights are fitted and controlled by switches on the instrument dash board. The latter is of polished mahogany, and in addition to the lamp switches, carries flush Stewart speedometer; flush Stewart rim-winding clock; latest Weston combined volt-ammeter with miniature electric lamp; and an ampere-hour meter.

The frame is of pressed steel, and the front is inswept in order to give a wide lock. The front axle is suspended on semi-elliptical springs. The rear axle is suspended by platform springs like the American Cadillac with double shackles. The transmission is direct from the motor in the frame to differential which is offset to the left on the rear axle by double helical machine-cut gears; ball bearings are fitted throughout. The motor develops 3 horse power and is of the double commutator series type, being totally enclosed. Its normal speed is 1,600 revolutions per minute at 76 amperes, 96 volts.



*The New Sedan Type of Electromobile.*

The wheel-base is 7 feet 6 inches, and the tread is 4 feet 6 inches. The rims are of the Warland divisible and demountable type, with spare rim and tire carried behind the body, as shown in the illustration. Avon tires are used, 820x120 mm.

In a large box slung under the chassis is the Chloride-Exide thin plate battery of 44 cells. It has a capacity of 165 ampere-hours, and weighs 32½ pounds per cell; between the bottom of the cell and the bottom of the plates is a sediment space 3¾ inches deep, with the result it is not necessary to clean out the battery until the end of life of the plates. Each cell has 15 plates with wood separators. The battery will give a range over average roads of 50 miles on one charge.

The control of the motor is by a foot-pedal combined with a main switch (with magnetic blow-out) and starting resistance which is of the carbon disk compression type, consisting of Ferranti tubular resistant units. Different speeds are selected by a handle placed below, but concentric with the steering wheel. The controller itself is under the front footboards forward of the pedals. The use of the pedal control admits of a lady or any inexperienced person driving the car. Three patterns of brakes are fitted, foot, hand and automatic electric, the latter short-circuiting the motor with a resistance, and employing it as a dynamo.

The switch-arm coupled to the pedal is normally held in the full-load position by spring tension; a partial depression of the pedal gives the equivalent of "clutch

slipping" for a momentary slowing up, and a full depression of the pedal cuts off current from the main controller, which can then be moved without sparking to any desired speed notch.

The driver can, of course, move the controller to the highest speed position to commence with, and start by the pedal, but this extremely rapid acceleration is not recommended, although it can be accomplished without any perceptible jerk.

An electric horn switch of the Seng type, one of the first of this pattern in this country, is fitted to the car. It consists of a metal ring mounted underneath and concentric with the steering wheel. When the ring is touched by the fingers at any point of its circumference, the horn is immediately sounded. This is most convenient, for without looking or releasing the steering wheel, the driver can readily give a loud warning with either hand. Further, the wiring for the horn is fixed in a stationary position and does not twist round the steering pillar, as is the case with a switch on the arms of the steering wheel. An American ampere hour meter is supplied which incorporates a differential shunt, correcting the readings automatically, and when charging when the battery is fully charged a pointer makes a contact with the small switch attached to the main circuit breaker and tripping it without an attendant necessary.

Motor Transport Year Book and Directory, 1916.—The motor industry is well provided with technical and practical handbooks, but hitherto there has been no financial and descriptive record of motor transport undertakings and the associated motor manufacturing concerns. This gap has been filled by the "Motor Transport Year Book and Directory, 1916," which the Electrical Press (Ltd.), 13-16 Fisher street, Holborn, W. C., England, will publish shortly at 10s 6d net.

Statistical and other information is given regarding 350 British motor transport undertakings and 300 motor manufacturing firms. A list of motor public service undertakings is given in alphabetical order according to district served; and the directory section includes the names and addresses of nearly 2,000 directors and officials of these undertakings.

R. Barton, Adamson & Co. (Ltd.). Registered with the H. M. Government March 8 and was formed with capital £2,000 and £1 shares, to carry on the business of manufacturers and repairers of motor and electric cars, vans, and motor and electric carriages of all kinds, aeroplanes and aircraft and components thereof, &c. Private company. First directors are R. Barton Adamson (managing director and secretary) and E. H. Stodart. Registered office: Sandringham Works, Enfield Highway, Enfield, Middlesex, England.



*G. M. C. Searchlight Trucks in the English Army.*

REFUSE COLLECTING BY ELECTRIC VEHICLES

Mr. J. A. Priestley, in a report presented to a subcommittee of the Sheffield Corporation, refers to the results obtained with electric vehicles fitted with Edison batteries in comparison with horse-drawn vehicles. These were used for collecting dustbin refuse, and he finds that when the total mileage does not exceed three per journey the horse-drawn vehicle is the most economical, but above that distance the electrically-propelled vehicles show a decided superiority. The following are some of his figures:—

| District. | No. I. | | No. II. | | No. III. | |
|---|---|---|---|---|---|---|
| Cost per ton, electric | 5s. 0.8d. | $1.21 | 2s. 3.4d. | $0.548 | 1s. 10.3d. | $0.446 |
| Cost per ton, horse | 7s. 0.4d. | 1.68 | 3s. 3.2d. | 0.784 | 2s. 6.2d. | 0.604 |

He states that in Sheffield, where the system of day and night work is in vogue, the electric vehicle is a pronounced success, and he recommends the extension of the method where opportunity offers, more especially as it renders possible the centralisation of the work, and the use of one destructor capable of dealing with all the refuse of the city.

## American Auto Invasion of England

A great number of motors and heavy lorries have been turned out for war transport, and this has prevented the extension of the motor omnibus in Birmingham and the district, as well as proper attention to the orders from London. A great deal of that class of business is temporarily in suspense. The private user of motors has been unable to get his orders accepted at the Birmingham factories, with the result that leading American motor cars are to be seen in large numbers, driven by private owners or housed at the various leading garages. The American car, in fact, is popular, and there have been some complaints by Birmingham motor manufacturers that their concentration on war work must lead to a permanent loss of this kind of business to American competitors.

Apparently the import duty on motor cars has not made much difference in the purchase of the American product. The Board of Trade returns show a remarkable increase for the past year in the imports of foreign cars, parts, accessories, and tires, the figures for the last three years being as follows: In 1913, $36,064,867; in 1914, $31,552,736; in 1915, $41,040,090. The greater part of the imports are American.

The zeal of Americans for business is shown by their readiness to carry the payment of part of the duty. At first cars selling at $1,703 were put up at $2,190, but they have since been reduced to $1,947. Some newer cars have been introduced lately in which prices have been cut. Dealers claim that the American success is largely attributable to the inability of British houses to compete, as all motor car factories are engaged on munitions work. In fact the leading papers, such as the *Automobile Engineer* of London, have printed long editorials warning the public against an invasion of American electric motor cars.

Forty-three of the 48 states will qualify for federal aid in roads under the bank head bill recently reported favorably to the senate by the committee on postoffices and postroads. Indiana, South Carolina, Georgia, Mississippi and Texas are the five states which have yet to equip themselves with a centralized direction on roads improvement.

# Accomplishments of the Passenger Electric

*Delivered at the Chicago Joint Meeting of the E. V. A., A. I. E. E. and the W. S. E.*

BY GAIL REED

THE important part which the passenger vehicle has played not only in the electric vehicle industry, but the entire motor car industry, is appreciated by only a few—that few being confined to the engineers and designers who have toiled consistently from the start on the development of the electric passenger car.

The electric passenger car has been responsible to a large degree for the engineering triumphs represented today in all types of motor-driven vehicles. So strong an assertion may appear overdrawn to the majority of technical men, but when the history of this type of vehicle is studied ample support will be found.

Briefly, the history of the electric vehicle, on which information to any extent is available, dates from the year 1892. Starting with the geared drives, which followed closely the first street car construction, we find this type held the boards till 1904, when the early chain drive models appeared. The single and double chain drives held sway till 1909, and during this period very important gains were made particularly from the standpoint of mechanical efficiency.

Up to this time, little progress was shown in body designs proper or in refinements and safety devices. In 1909 the chain drive construction gave way to the shaft drive, with its attendant simplicity and silence. Not only did the mechanical construction show decided improvement, but important refinements were made in the body design.



*Women May Dress in Their Finest Gowns and Step Into Their Electric, in This Case a Chicago, and Drive Away and Step Out of the Car at the End of the Journey Immaculately Clean.*

The success of the cars was by this time attracting new capital to the commercial possibilities of the electric vehicle and several additional concerns were actively engaged in their manufacture. Of equal importance was the interest manifested by the manufacturers of motors, batteries, tires, bodies and electrical equipment. At this period the influence of the electric passenger vehicle first made itself felt with any degree of strength, throughout the motor car industry.

In 1910, 11 and 12 the industry made its greatest advance, not only in manufacturing methods, but design, quality, refinement, efficiency, safety and comfort.

The engineering problems originated and perfected for electric passenger cars were the stepping stones to the wonderful advance made since in the entire motor car industry.

The following covers briefly the more important factors in the construction of the modern motor car, for which the passenger electric has been responsible to a large degree. It is needless to state that simplicity in construction has identified the electric vehicle from the beginning. It has been every motor car manufacturer's aim to meet as nearly as possible the simplicity of the electric, for directly hinging on this factor, is dependability.

Due to this simplicity, solid tires were first used on electrics. The use of these tires led to the development of heat treated steel, for this practice necessitated the development of better materials throughout in order to withstand and absorb increased vibration.

The very important part that heat treated steel plays today in all motor cars requires no further reference here.

The electric car has always been essentially a town car, for that reason the high stage of refinement reached in body construction on electrics has made its influence felt on all closed car designs. The first car developed with control sufficiently simple to be driven by any member of the family—was the electric. This factor has always been pre-eminent with the electric vehicle and was responsible for self-starters, improved gear shifts, left-hand controls, and the up-to-date electric systems found today on all fine motor cars.

The ingenuity with which the control on electric vehicles has been developed deserves the highest praise. In the modern electric it is practically impossible to operate the car improperly—in fact, the only factor not incorporated in the control of the up-to-date electric is the personal factor. Two important developments in the motor car industry can be traced to this simple, trouble-proof control system. First—the more general use of motor cars not dependent on hired drivers. Second—the general careful development of all control or driving apparatus used today. The electric vehicle offered the standard by which all these developments were measured. It will be noted that electricity plays the most important role in this development—current starts the motor—current supplies the life spark and current furnishes the lights, and today in the latest gas car construction, current controls the speeds. For elasticity, flexibility, instant response

and perfect flow of power, the electric's control is supreme.

It is not unreasonable to trace the origin of the multi-cylinder gas motors to the electric vehicle—the attempt of engineers to furnish a power plant and control that approaches the ideal in flexibility and velvet smoothness—and again the electric vehicle furnishes the standard of measure. The praise superlative of the gas car today is to say that it operates as smoothly as an electric.

Separate in a sense, but still having considerable bearing on the control subject, is the storage battery. The development of this important factor can be credited in a very large degree, almost exclusively, to the electric passenger car—for originally outside of central station work, the electric vehicle was the sole user of storage batteries. The manufacturers of accumulators have made exceptional progress. The battery capacity offered today has been greatly increased without sacrificing valuable compartment space, in many cases an increase of nearly fifty per cent is shown, compared with the capacity and space available formerly, and with much less weight per unit power. Not only has the capacity and weight question been vastly improved, but the durability and wearing qualities have practically increased two-fold. The development of the storage battery to its present high state of efficiency has proven one of the most potent factors toward the advance made by all motor cars. Today electric systems control all cars.

Our gasoline brethren can thank the electric vehicle for bringing about the development that has done more to promote the general use of motor cars than practically any other one factor.

To the student of progress in the electrical field, the development of the electric storage battery alone furnishes an exceptionally rich subject.

The noted progress made in electric motor development is directly traceable to the electric passenger vehicle. The performance of the modern vehicle motor offers a subject full of interest. When the service to which the motors are subjected is fully realized, their records appear extraordinary. An electric passenger car is seldom handled by a driver who even stops to think the car has such a thing as a motor—from a standing start the controller is thrown into extreme speed, and variable loads must be contended with at all times. Overloads of the most severe nature are encountered—not infrequently these run as high as 300 per cent—a constantly changing potential must be dealt with and practically all the other unusual stunts that can be thought of must be met by the modern electric vehicle motor. In spite of all these untoward conditions, motor trouble is an unknown quality. To the high scientific development of the vehicle motor is due to a great extent the progress made by the electric commercial cars and incidentally the opening of the largest motor market in the industry, the starting and lighting systems used universally today on all gas cars.

The electric passenger car has proven to the public in general the possibilities of the electric commercial car and the electric taxi by bringing home to the business heads the fact that the electrically propelled vehicle is not only supreme for dependability and safety, but most economical.

In judging the structural progress of the passenger car, straight mechanical and electrical efficiency measures must not alone be used. It has been equally important that the safety and control factors be developed to the nth degree, for passenger cars are seldom ever driven by skilled chauffeurs—the esthetic side has probably played, if anything, a more important part than the mechanical from the standpoint of successful progress—for in addition to the highest structural merit, beauty of lines and harmonious proportions have been altogether necessary. Superior constructed electrics have gone down in battle many times before inferior cars graced with more desirable lines—this was but a temporary condition in most cases—but was ample proof to progressive manufacturers that lines and beauty are as essential to the modern electric as power and efficiency. The progress made in this respect has been equally pronounced.

Compared with the passenger vehicle of only five years ago, you have instead of a dumpy looking box on wheels, a striking smooth lined limousine designed so the driver's vision is never obstructed—instead of a short 60 to 75 inch wheel base, the present average runs nearer 104—still maintaining the short turning radius of the 75 inch wheel base. The seating capacity has increased from two and three passengers to four and five, with spaciousness and comfort for all.



*Leaving for a Morning Spin Through the Park in a Chicago Electric.*

Picture this smart designed limousine, weighing, with passengers, a total of 4,500 lb., traveling with velvety smoothness and silence as high as 22 miles per hour, instead of the former 16 to 17 mile rate, covering all manner of roads with utmost comfort on tires that cannot puncture or blow out, operated with no more effort than the turning on of a light switch, with capacity for a straight run of from 65 to 80 miles without recharging, and you will begin to realize the great progress that modern engineering has made in the electric passenger car.

The late electric passenger car is a scientifically designed electrical and mechanical masterpiece and in itself will be found a very rich and instructive subject for all interested in electrical development.

The electric passenger car today meets most completely all the requirements of the finest motor car, with greatest economy, efficiency and comfort. Safety is synonymous with the electric car for ingenious engineering has developed this factor on the modern electric to the highest degree. The electric car has won first position in the public's esteem for motor refinement, serviceability and economy. Approximately 35,000 electric passenger cars are operated in the United States today.

When in addition to its own particular field, proper consideration is given the far reaching influence the electric passenger car development has had upon its many allied lines, it is only fair to assume that this product of

electricity will be accorded the high rank and honor befitting its accomplishments.

In order to realize what has happened and is actually happening in the field today, let us look at the data regarding the maintenance of an electric passenger vehicle. This data on actual operating costs had been carefully compiled by leading manufacturers. The figures are not based on ideal cases, but give as fair a general average as can be compiled on the total maintenance of the electric passenger car today. The following notes will serve as a guide on the basis for many of the figures given:

*Insurance*—Includes full coverage on public personal injury, property damage, damage to car, fire and theft.

*Tires*—Figured on basis of using Firestone Special Electric, 36 by 4½ inches, guaranteed for 10,000 miles.

*Paint*—Complete burn-off.

*Overhaul*—Figures obtained from service records, where all work is done on cars.

*Garage*—Thirty-five dollars per month, which covers charging, washing, polishing, delivering and storage.

*Batteries*—Complete renewal, carrying guarantee of 12,000 miles. Including wash job and incidental repairs. On rental batteries, charge of $16 per month.

In compiling the data on electrics, liberal allowances have been made, as, for example, on paint, where figures are based not on an ordinary revarnish or $75 paint job, but on the best job procurable, a complete burn-off.

WHEN KEPT IN PRIVATE GARAGE

While no allowance has been made for cost of space or rent, and such items as flushing, washing and polishing, it is only fair to state that these items should be considered under private garage, for all these items are included in cost under public garage.

| | *Cost of Gas Car Over Electric in Percentage* |
|---|---|
| Insurance $2,000 | 11 |
| Tires | 100 |
| Paint | 20 |
| Overhaul, etc. | 366 |
| Batteries | ... |
| Current | ... |
| Total | 32 |
| *With Rental Batteries.* | |
| Battery | ... |
| Total | 55 |

(Current based on flat rate of 0.055 per kw-hr.)

*Based on 6,000 Miles Per Year.*

| | |
|---|---|
| Total | 29 |

WHEN KEPT IN A PUBLIC GARAGE.

Note—We are giving herewith comparative percentage figures indicating the saving of the electric car over gas cars. The figures upon which the gas car percentages are figured were obtained from various repair shops, garages and private owners and represent a fair general average.

*Based on 12,000 Miles Per Year.*

| | *Cost of Gas Car Over Electric in Percentage* |
|---|---|
| Insurance $2,000 | 11 |
| Tires | 100 |
| Paint | 20 |
| Garage | 29* |
| Overhaul, etc. | 366 |
| Batteries and battery incidentals | ... |
| Total | 27 |
| *With Rental Batteries* | |
| Batteries | 37 |
| | 44 |

**Difference in favor of gas car. This includes cost of charging and delivering electric car but does not cover gasoline or oil for the gas car.

TOTAL UPKEEP.

Inasmuch as a chauffeur is necessary with the majority of gas cars to give the same full service as an electric, the following figures apply. Both cars kept in public garage and gas car run by chauffeur, using same figures as before on other items.

| | *Extra Cost of Gas Car* |
|---|---|
| Total upkeep for electric | 116 |
| *With Rental Battery* | |
| Total upkeep | 144 |
| *Both cars kept in private garage and gas car run by chauffeur:* | |
| Total upkeep | 143 |
| *With Rental Battery* | |
| Total upkeep | 185 |

COST OF OPERATING ELECTRIC CAR ON COST-PER-MILE BASIS.

| *Garage—Private Battery Bought* | 6,000 *Miles Per Annum* | 12,000 *Miles Per Annum* |
|---|---|---|
| Tires | $0.02086 | $0.02086 |
| Overhaul, etc. | 0.00625 | 0.00625 |
| Batteries | 0.0291 | 0.0291 |
| Current | 0.012 | 0.012 |
| Total | $0.06821 | $0.06821 |
| With Rental Battery | 0.032 | 0.016 |
| Total | $0.07111 | $0.05511 |
| *Garage—Public Battery—Bought* | 0.0291 | 0.0291 |
| Total | $0.12621 | $0.09121 |
| With Rental Battery | 0.032 | 0.016 |
| | $0.12911 | $0.07811 |

## Motor Vehicles in Mexico

When business again opens up in Mexico it is expected that an important demand for automobiles and motor trucks and delivery cars of American manufacture will be manifested. The trade in tires and accessories has already reached considerable volume and is said to be increasing gradually, said Vice-Consul W. P. Blocker in a recent report.

It is practically four years since Mexico was eliminated as a market for motor vehicles. At that time nearly every automobile manufacturer of the United States was represented in the various cities of the republic. Garages and dealers were located in all of the chief cities and large stocks of tires and accessories were carried. In those days the trend of the demand was toward the higher-priced French cars, and in the City of Mexico there were to be seen more automobiles of French than of American manufacture, consequently a large proportion of the tires and accessories came from Europe.

While there has been some replenishing of automobile stock during the last few years, and particularly during the last few months, Mexico is still a virgin field for this class of trade.

The demand is now beginning to extend to private users. In this connection it may be well to mention that the prevailing idea in the United States seems to be that the people of Mexico have exhausted or lost all their wealth. This is an erroneous idea. While it is true that many have had their fortunes badly depleted, there is still much actual cash in the country, and it is hoped that it will be placed into circulation as soon as political conditions will permit. Not long ago a sales company on the border filled an order for tires and tubes for delivery to a commission broker in the City of Mexico that aggregated $25,000 gold.

The fact that the country is now short of good horses and that many people have no means of getting about in carriages as formerly is one of the elements that enter into the growing demand for motor cars.

## A New Method of Locomotion

The Panama-Pacific Exhibition inaugurated a new means of transport on a commercial scale, that of the electric motor chair, sometimes called an electric invalid chair, while in England it is referred to as the electric bath chair. It is the logical development of its big brother, the motor car. It is very interesting to note that our London correspondent refers to their widespread use abroad in this same issue of Electric Vehicles. It provides the only means of pleasant and comfortable transportation along the board walks of the summer resorts of our country, such as Atlantic City, Old Orchard Beach, Maine, Newport and other fashionable resorts. It provides luxuriousness through the shaded by-paths of the parks and comfort and peace to the invalids in the hospital corridors or the convalescents on the grounds.



The Electric Motor Chair Company, 717 Railway Exchange, Chicago, Ill., owns the Semple Scott and Chrysler patents, under which it manufactures its motor vehicles.

The motor chair consists of a motor, controller and storage battery mounted on substantial running gear with ball bearings and rubber tires. These are so skillfully co-related as to form a perfect running, self-propelled vehicle under absolute and easy control, and protected by exclusive patents. It can be adjusted to any speed from one to ten miles per hour. When going down hill, the rated speed is not exceeded more than from ten to fifteen per cent.

It has one very important feature secured under its patents by which, should the chair come in contact with any obstacle, the current is automatically turned off and the brakes are set, bringing the chair to a standstill. The value of this feature in eliminating the risk of accidents will be readily recognized.

The bodies of the chairs, of willow or pressed steel comfortably cushioned, are made of various forms to suit the requirements of purchasers, or can be built to their individual designs. The company will advise intending purchasers as to all details to fulfill their requirements.

This company is now prepared to manufacture and sell chairs either to individuals or to dealers in any quantities. It will also arrange special terms for corporations desiring to operate at seaside resorts. The company is organizing branches in the principal cities for the convenience of its clients where the chairs can be seen in practical operation.

The Panama-Pacific International Exposition at San Francisco approved this chair for the Electric Chair Concession after a thorough examination and test of its practical operation.

The operation of the chair is practically foolproof, as there is only one pedal which starts it, stops it and applies the brakes. To stop it the passenger merely shoves the pedal forward until it locks and the chair stops with the brakes set, even on the steepest hill. For those whose lower limbs are incapacitated a hand control is fitted. The chair is easily steered with a tiller handle requiring practically no effort to guide the car. If the lever is released the car's tendency is to go straight ahead.

As it weighs very little over four hundred pounds and its maximum speed is about six miles an hour on the level it is easily stopped in a few feet. It can take any ordinary grade in a boulevard or park up to a ten per cent grade with ease with a five hundred pound load.

The battery is a twelve volt, 150 ampere hour capacity job, a standard Exide that can be charged at any garage or at home if a charging set is used. The battery supplies current to a one-half horsepower motor which drives the car through a chain down to the twenty inch wheels with solid tires. The wheel base is long enough to give plenty comfort, being a trifle over four feet.

The chair is equipped with a rear and two front lights that illuminate the road for thirty feet ahead, which is safe for cool night riding in the hot weather.

## One Lonesome Electric in Peru

Although there has been some interest aroused in South America in motor transportation, the field is very limited in such countries as Peru, except to colonial models of extreme road clearances.

Lima is practically the only place in Peru where motor vehicles are used, and 300 automobiles is a liberal estimate, the majority of which are American-made taxis. The private cars as a rule are of European make. The streets are narrow and not well paved. There are practically no roads on which an ordinary automobile can be run. There is only one electric vehicle in Lima and probably in the entire republic, so far as can be learned.

Electric power is extensively used in the Lima district, and current for charging batteries could be obtained at a reasonable price. The possible field for electric vehicles is not large now, though with the abundant and comparatively cheap electric power, a small demand for them might be created.

## A Few Don'ts for Salesman

Don't talk a man into buying a five-ton truck when you know he only needs a two-ton truck. If you do dissatisfaction will follow and he will tell his friends that you are crooked.

Don't offer special inducements, such as free lamps or windshields, to your customers. Make your product sufficient inducement to make your people want to buy.

# News of The Electric Vehicle Section, N. E. L. A.

*Sectional Development Work, Reports of Committees and New Announcements*

**This department gives the record of all activities of the Electric Vehicle Section of the National Electric Light Association in all of its sections, as reported by A. Jackson Marshall, national secretary.**

**Realizing the valuable co-operative development work which the association is doing, the publishers of ELECTRIC VEHICLES offer this exclusive section to association members and all electric vehicle interests in order that they may keep closely in touch with association matters.**

### AFFILIATION WITH THE N. E. L. A.

AT A special meeting meeting of the Electric Vehicle Association held in the Engineering Societies Building, New York City, on Friday evening, March 10, the invitation of the National Electric Light Association to the Electric Vehicle Association of America to affiliate with it as a section, to be known as the Electric Vehicle Section, was presented and unanimously accepted.

The meeting was addressed by President Walter H. Johnson, who presided, President, E. W. Lloyd and Secretary T. C. Martin of the National Electric Light Association, W. H. Blood, Jr., the first president, and Frank W. Smith, the fourth president, of the Electric Vehicle Association of America.

It was the consensus of opinion of all present that the affiliation of the Electric Vehicle Association with the National Electric Light Association would prove extremely beneficial in promoting electric vehicle development, and the manufacturers and others were urged to take full advantage of the unprecedented opportunities offered. The folowing resolution was unanimously adopted:

Resolved, That it is the sense of the members of the Electric Vehicle Association and of this Association that it accept, and it hereby does accept, the invitation extended by the National Electric Light Association on January 14, 1916, to become affiliated with it as an Electric Vehicle Section of that body; and be it

Further Resolved, That all of the members of the Electric Vehicle Association of America who are not on this date (March 10, 1916) members of the National Electric Light Association, be and they hereby are requested to become members of the National Electric Light Association; and

Be It Further Resolved, That as soon as the individual members of the Electric Vehicle Association of America are elected members of the National Electric Light Association, that this Association (Electric Vehicle Association of America) take such steps as may be necessary to be legally dissolved; and

Be It Further Resolved, That all of the funds at the time of the said dissolution in the treasury of said Association, less all charges against the same, be turned over to the Electric Vehicle Section of the National Electric Light Association.

### CHICAGO CONVENTION, MAY 22-26, 1916.

Hereafter, the Electric Vehicle Association will be known as the National Electric Light Association—Electric Vehicle Section, and the officers and titles under the new arrangement will be as follows:

*Section Officers:*

Walter H. Johnson, chairman; E. S. Mansfield, vice-chairman; H. M. Edwards, treasurer; A. Jackson Marshall, secretary.

*Executive Committee:*

W. G. Bee, Charles Blizard, W. H. Blood, Jr., E. P. Chalfant, H. M. Edwards, John F. Gilchrist, Walter H. Johnson, W. P. Kennedy, James H. McGraw, E. S. Mansfield, A. Jackson Marshall, Frank W. Smith, C. N. Stannard, P. D. Wagoner, Arthur Williams.

*Local Section Chairmen:*

J. T. Day, chairman, New England, George B. Foster, chairman, Chicago; R. L. Lloyd, chairman, Philadelphia; R. B. Emerson, chairman, Washington, D. C.; J. W. Schrantz, chairman, Cincinnati; C. W. Hutton, chairman, San Francisco; Harry W. Harrison, chairman, Los Angeles; W. A. Donkin, chairman, Pittsburgh; F. Nelson Carle, chairman, New York; J. W. Brennan, chairman, Detroit; Hayden Eames, chairman, Cleveland; R. A. Merritt, chairman, Toronto; E. M. Jackson, chairman, Denver; F. E. Stevens, chairman, St. Louis; Will Spalding, chairman, Portland, Ore.; Henry J. Schneider, chairman, Western New York.

Coincident with the convention there will be an extremely interesting electrical exhibition in the Auditorium theater at which will be displayed electric vehicles of all types, both passenger and commercial, and accessories, batteries, charging apparatus, etc.

It is anticipated that several thousand central stations (electricity supply companies) representatives, including executive, will attend the Convention, and it is believed that the exhibit will afford the manufacturers of electric vehicles an unprecedented opportunity to acquaint influential central station interests with the merits of the electric vehicle. Effective co-operation in promoting general public interest in the electric vehicle is confidently expected from this source.

The Exhibition Committee has announced the arrangements made for the display of electric vehicles and accessories. The Congress, Annex and Auditorium Hotels offer unusual facilities for convention purposes, and the exhibits will be located in the Auditorium Theater which is a part of the Auditorium Hotel. There are entrances to the exhibition floor from any part of the hotel and it is also connected with the Congress and Annex by a tunnel, making an exceptional arrangement both for members as well as exhibitors.

The floor plan, giving all details in connection with the exhibits, shows some fifty-three booths of unusual proportions, with an aggregate floor area of 10,550 square feet of space for exhibit purposes. Manufacturers will begin installing their exhibits, May 22 at 8 o'clock a. m., all work and details of the display being entirely completed by 8 a. m. the following day. Other details and floor plans may be obtained from the Electric Vehicle Section of the National Electric Light Association.

The Electric Vehicle Exhibition is especially noteworthy at this time when the low operating costs of electrics are being accentuated by the soaring cost of gasoline and when electricity supply companies (central stations) are the more thoroughly appreciating the valuable load—the profitable vehicle charging load.

An electric vehicle program of particular interest to the central stations and the electrical industry in general, has been carefully prepared and from the manuscripts in hand, assurance is given of a highly successful convention.

The first session devoted to electric vehicle interests will take place on Wednesday afternoon, May 24, and will include the following program:

Chairman's Address, by Walter H. Johnson.
Secretary's Report, by A. Jackson Marshall.
Treasurer's Report, by H. M. Edwards.
Reports of Section Activities.
Report of Membership Committee, Joseph D. Isreals, Chairman.
Report of Standardization Committee, E. R. Whitney, Chairman.
Report of Motion Picture Film Committee, by Carl H. Reed, Chairman.
Report of Traffic and Good Roads Committee, A. H. Manwaring, Chairman.
Report of Insurance Committee, Day Baker, Chairman.
Appointment of Nominating Committee.

The Thursday Morning session will be devoted to the following program:

Report of Garage and Rates Committee, George B. Foster, Chairman.
Report of Legislation Committee, P. D. Wagoner, Chairman.
Report of Federal and Municipal Transportation Committee, J. H. McGraw, Chairman.
"Industrial Truck Applications," by C. W. Squires, Jr.
"Electric Truck Troubles and How to Eliminate Them," by F. E. Whitney.
"The Relation of Tires to Electric Vehicle Efficiency," by S. V. Norton.
"Greater Garage Service," by Harry Salvat.

The program for the last session Thursday afternoon is as follows:

Report of Operating Records Committee, W. P. Kennedy, Chairman.
Report of Central Station Cooperation Committee, E. S. Mansfield, Chairman.
"Exchange Battery Systems," by P. D. Wagoner.
"Passenger Vehicle Problems and Activities," by E. P. Chalfant.
"Central Station Promotion of Electric Vehicle Use," by W. P. Kennedy.
Report of Nominating Committee.

All manufacturers interested should immediately communicate with Mr. McConnaughy, secretary of the N. E. L. A. Convention Exhibition Committee, 299 Broadway, N. Y. C., or the secretary of the Electric Vehicle Section of the National Electric Light Association, 29 West 39th street, N. Y. C., either of whom or both will be only too happy to supply any information desired.

The hotel committee, through E. A. Edkins, will be very glad to give full information regarding them if the request is addressed to him at 72 W. Adams street, Chicago, Ill.

ELECTRICAL EXHIBITION AT CHICAGO CONVENTION.

In addition, it is expected that space will be made available on Michigan boulevard and Grant Park, immediately opposite the Auditorium Theater, for the display and actual demonstration of electric vehicles. This exhibit will afford the electric vehicle manufacturers a very unusual opportunity to present their products directly to the central station executives and representatives. Now that the electric vehicle industry will have the close co-operation of the several thousand central stations, members of the National Electric Light Association, it is all the more desirable that these extremely important factors be fully acquainted with the capabilities of the electric, and the importance of the electric vehicle load to central stations.

It is earnestly hoped that all electric vehicle and accessory manufacturers will avail themselves of this privilege to effectively display their equipment, so that the activities of the Electric Vehicle Section, after the Convention, may be largely devoted to profitably exploiting the electric vehicle with the central stations whose real co-operation will prove to be invaluable.

LOCAL SECTION REPORTS—CHICAGO

At the February 15 meeting of the Chicago Section, which was held at the Hotel Metropole, George H. Jones presiding, the Secretary reported a change in the parking service, in that the two stations, viz., Electric Shop and C. Jevne, would go back into service February 17. This brings the locations as they were formerly.

Judge Adelor J. Petit was then introduced by Mr. Jones and talked on "Garage Lien Law," which are, in brief, as follows:

The garage lien law is more a practical matter than a matter of law. Nearly every other class of business can have some sort of lien placed upon it. The automobile industry sprung up so fast that this matter seemingly has been overlooked up to the present time, although several states are beginning to get busy in the matter.

Judge Petit did not dwell on what a garage lien law was or why we should have one, so much as he did on how they should go about putting such a law through. He maintained that the best method was to find out that element in each district of the states, which is most essential or peculiar to that district. Anything which will help re-elect a legislator would be supported by him or by any other power behind him.

This law should protect all concerned; the man who sold the car on time or the one who might hold mortgage on same, etc., etc. Be sure of all elements entering into the law. Then be sure to put in something that will benefit the public and then the public will demand such a law. For instance, a clause requiring the registration transient car in the garage. This will enable stolen cars to be more easily traced from one place to another and the public can be made to see that this law will benefit them by making it practically impossible for anyone to steal a car and get away with it.

It was moved by Frank A. Putt and duly seconded, that a vote of thanks be tendered Judge Petit for the excellent talk which had been rendered and this was unanimously and immediately acted upon.

The February 29 meeting was also held at the Hotel Metropole, George B. Foster, chairman, presiding.

R. A. Wilson, the new secretary and manager of the National Automobile Trade Association, which association is the outcome of a change in the name of the Associated Garages of America at the

first annual convention last January, spoke on "Garage Insurance."

Mr. Wilson said that the association and trade journals have been active on Insurance problems of late and generally have confined themselves to a clean-up basis. In other words, they have advocated cleaning up the premises, which, in itself, would cause a better insurance rate to be earned, and so far the results have been poor. Insurance, in effect today, is written by old line companies, and ordinary companies, as a rule, are very shy, and have thought that "Burn-outs" were very certain to happen. A few years back buildings used for garages were old or made over from livery stables, etc., and there was not much care used in handling the material, gasoline, oils, etc. The fact in the matter is that the fire loss in garages is less than 10 per cent and the reason there has been no reduction in the present high rates, is because the old line companies have practically no competition. The association which Mr. Wilson represents, has started a Garage Insurance Department on the basis of what data they have been able to secure. They feel sure that the losses will never exceed 25%. Their ratio of expense to insurance fees will be also kept below 25%, and thus, the garages can obtain insurance for about 50% of the present rates through their system. They further believe that after they have been able to establish their own loss data, that the figures may show up even better than this. These plans, together with the inter-insurance that can be available, is bound to work great economy for them in being able to sell low-priced garage insurance to members of their association. He also announced that for the time being, they have thrown the doors open and it was not necessary to be a member in order to take out insurance privileges as above specified. They are also going to weed out the inconsistent clauses which are contained in so many modern insurance policies, some of these clauses being absolutely contradictory to each other. As a result of this only a very small per cent of those insured are really fully protected today.

Therefore, a policy overseen and put out by this association will not only be cheaper but will give full protection.

The March 7 meeting, which was also held in the Hotel Metropole, George B. Foster, chairman, presiding, was given over to general discussion, no regular program being provided.

Harry Salvat of the Fashion Auto Garage thought more publicity ought to be given to the electric vehicle locally. He thought that every month or two some stunt could be pulled off of such a nature that an account of it could be published in the newspapers. The secretary announced a plan that had been broached to him by one of the members. This had to do with the "Electric Vehicle" Fair or Exhibition on the vacant lots on the Motor Row, between 22d and 23d streets and from Wabash avenue to Michigan avenue. Every one thought favorably of the proposition. Mr. Salvat said he was willing to donate a month's garage fees or $25.00 in cash to be used as a prize in some of the contests that might be arranged. Mr. Salvat further suggested some "Electric Runs" which might do well for a starter and thus keep the subject constantly before the public. The runs would tend to improve the social features as well as the public idea concerning the durability and dependability of the electric vehicle.

The March 14 meeting, at which Chairman George B. Foster presided, was also given over to general discussion.

The discussion was started on what the local Standardization Committee was doing. It was suggested that the standardization of miniature lamps for vehicle use be taken up. It was mentioned that one garage man had taken note of the different kinds and types of lamps that were necessary for him to keep in stock in order to give service to his customers and the number was well over one hundred. It was the opinion of all those present that taking into consideration all kinds of trucks and pleasure cars, there is really no need for more than one-half dozen different lamps, if some effort would be made toward getting some of the manufacturers to standardize their lighting equipment. It was mentioned that the Chicago Garage Owners' Association, which runs largely to the gas type, were going to take active steps along the lines just mentioned with the manufacturers of gas automobiles and trucks. There was considerable discussion concerning the difficulty that would be encountered in standardizing lighting equipment due to the fact that a different lighting requirement is called for by nearly every state, and that it might be necessary to do some missionary work toward standardizing the law as well as the lamps.

There was some discussion brought out on the matter of providing a demonstrating electric truck, the expense for which are to be met by the benefited manufacturers, including the battery companies. This brought out a diversity of opinions and it could be readily seen that the matter would have to be more carefully gone into than it has been so far, before much success could be expected from the proposition.

O. P. Smith related an incident recently observed by him, wherein a laundry was considering electric trucks in place of other forms of delivery, principally from the standpoint that in this particular case thirteen routes would be reduced to eight. Their reason for favoring the reduction being that as the men are paid a commission on the business they do on their routes and as they only have at the present time seven or eight good paying routes, the consequence is that the other five or six drivers are constantly changing, due to ill paying routes and the tendency of the men to become discouraged before they work up a good route for themselves. Thus the reduction in the number of routes would eliminate the doubtful ones and enable this company to just about provide for their old-time and faithful employes. We have elaborated upon this point, thinking perhaps it might prove a useful suggestion to some electric truck manufacturer in connection with the sale of trucks under similar conditions.

D. M. Simpson brought out a point in comparison between electric and gas cars, which applied particularly where the transportation is in the use of solicitors. It is generally conceded that those hired to solicit and drive their own gas cars are found to be essentially drivers, as most of their time and interest is taken up in running their gas cars, while on the other hand, a man possessing an electric will be found to be essentially a solicitor, as the running of the electric car becomes a secondary proposition in his daily work.

The March 27 meeting of the Chicago Section of the Electric Vehicle Association was held in the evening in the rooms of the Western Society of Engineers in the Monadnock Building, where a joint meeting of the two above organizations and the Chicago chapter of the American Institute of Electrical Engineers convened. The subject under discussion for the evening was "Elec-

tric Vehicles." Although the meeting was delayed, the four papers were discussed until late in the night. Frank Allen Putt of the General Electric Company gave the first paper, very well illustrated by slides, on "Electric Vehicle Motor Characteristics," which is given in toto in another part of this issue of ELECTRIC VEHICLES, as are papers of W. F. Hebard of the Buda Company on "Electric Industrial Trucks and Tractors" and of Gail Reed of the Chicago Electric on the "Electric Passenger Vehicle." The latter was also amply illustrated in a very comprehensive manner by slides. W. J. McDowell of the General Motors Company, who followed, gave a short talk on commercial vehicles of various types, which was, like the other addresses, enthusiastically received by the hundred odd listeners present. It was easily the best meeting this spring in Chicago.

The noonday luncheon meeting at the Hotel Metropole on April 4 was without any definite program and a good many congenial and informal talks on personal experiences were heard.

The next week's noonday luncheon brought a good attendance. W. F. Bauer of the Chicago Section Standardization Committee presented his report on the subject of lamps. In the discussion it was brought out that at present the voltages in use on electrics ran from 6 volt on the Bailey headlight to 8-32 40-42-68-70-72-75-80-84-90 volts, the latter voltage being used on the R. & L., and the G. M. C. and G. V. trucks. The lamps are rated at wattages from 4 to 25, while the candlepower runs as low as 2 c. p. in several cases up to a 16-c. cp. headlight on the Bailey. At present it is necessary for a dealer to carry some forty styles in stock if he wishes a full line. It has become imperative to standardize, and the moment has now arrived. Mr. Foster, the chairman, after going over the situation, called for a final report at the next week's meeting on the eighteenth of April.

As W. P. Kennedy, the well-known transportation engineer of New York city, was in Chicago as the guest of the Commonwealth Edison Company, he was graciously given the opportunity of addressing the meeting of the eighteenth by Chairman Foster. Mr. Kennedy spoke at some length on the electric motor car industry as he sees it today. He pointed out the necessity of concentrating on the domestic trade with a definite sales policy and attracting the public's attention to the electric motor car. This means advertising of various sorts. When one realizes that nearly the entire bulk of newspaper and magazine auto advertising is that of gasoline cars, it will naturally attract more attention than that of the electrics. The industry, then, must meet the full-page and half-page ads of the gas cars and bring to the public the pertinent and snappy facts regarding the inherent economy of the electric motor car in such a way that they will read it and be convinced. He quoted figures obtained in an extensive mailing campaign in which over 150 owners of big electric fleets expressed their entire satisfaction with their trucks and gave definite figures as to the low cost of operation. Such fact must be driven home time and time again. He pleaded for a more intelligent interest in electrics. He stated that even among central station men who were advocating their use knew little about electric motor cars. At the New York Engineers' Club he asked a group of the members to name six central station men who really understood the car, and that impromptu jury of trained technical men finally decided that three, and three only, knew their business. It doesn't stop here, he stated, the garage man is often at fault. In conclusion he thought everyone should now get more closely together than ever before, as the coming convention will be the opening wedge in a big sales drive, which would result in better conditions than were ever even contemplated. Harry Salvat, at the conclusion of Mr. Kennedy's talk, gave a spirited defense of the garage men and told of some of the things with which they were burdened, which he maintained were the fault of the battery men and the manufacturers and for which the garage men were not responsbile. A general discussion followed. W. F. Bauer then gave the final recommendation for lamps. His committee favored a one and a half inch bulb forty volt lamp of twenty-five watts. After a rising vote of thanks to Mr. Kennedy, the meeting adjourned.

### LOCAL SECTION REPORT—NEW ENGLAND

The final meeting of the New England Section, Electric Vehicle Association of America, which has recently been merged with the National Electric Light Association, was held at the Hotel Thorndike, Boston, April 11. E. S. Mansfield, of the Boston Edison Company, presided and announced plans for the May convention in Chicago, where it is expected electric vehicles will be an important subject for discussion.

George H. Hudson, district manager for the General Vehicle Company, spoke on the comparative costs of gasoline and electric vehicles. He pointed out that the electric is the logical transportation agency in congested city streets. Important advantages are the greater readiness with which drivers learn to operate the electric truck, its longer life and, hence, lower depreciation cost, and the greater mileage obtainable from tires.

Present gasoline prices are another powerful inducement to adopt the electric rather than the gas car. Current for charging costs about the same as for gasoline at 12 cents per gallon. One gallon of gasoline, operating a given truck three miles, gives a fuel cost of 8.3 cents, with gasoline at the present price of 25 cents. Under the co-operative charging rate furnished by the Boston Edison Company, the cost would be five cents a mile. Garaging charges are much less for the electric than for gas cars, and drivers' wages are $15 to $16 per week, while chauffeurs of gasoline trucks receive at least $18, and up to $25.

Mr. Hudson gave the total yearly operating cost for 5-ton trucks running 30 miles per day, as follows: Fixed charges, electric, $691; gasoline, $1,264 (7.6 and 14 cents per mile, respectively); operating cost, electric, $2,772; gasoline, $2,824, a difference in totals of $625 in favor of the electric. Daily costs would be $11.54 and $13.62, respectively, and costs per mile 38.4 and 45 cents, respectively. This is on the basis of electricity at the comparatively high rate of five cents per kilowatt-hour, and gasoline at 25 cents per gallon.

D. C. Jackson, professor in the Massachusetts Institute of Technology, described the tests made by a department of the institute which clearly proved that the electric is supreme in the field of short-haul freight handling. He pointed out the relative merits of various types of road surface, saying that hard asphalt, kept in good condition, is the most favorable for the operation of motor vehicles, with wood block, water-bound macadam, vitrified brick, cement-bound granite block, tar macadam, gravel or cinder, and cobblestone next in order. Granite block filled with sand, while excellent for horse-drawn vehicles because of the purchase given to shoes, is at great disadvantage for motors, offering 2.5 times as much the resistance of good asphalt or wood-block road. The almost universal use of motor vehicles in London, Paris and Berlin is in large part due to the smooth road surfaces in those cities.

A committee motion was carried to appoint a committee to confer with the city officials planning street improvements in Boston. The meetings will be resumed next fall.

NEW YORK SECTION

On Thursday, March 16, at the Automobile Club of America, the members of the New York Section, the Motor Truck Club, and the Automobile Dealers' Association, united with the Metropolitan Section of the Society of Automobile Engineers to welcome Russell Huff, president of the Society of Automobile Engineers, the Council and prominent authorities on fuel, and to listen to an address on "The Automobile Fuel Situation" by E. S. Foljambe of the *Commercial Car Journal*, Philadelphia, which was preceded at 6:30 by an informal dinner.

Several notices were sent out prior to the meeting, one of which headed "Gasoline Is Going Higher!" also contained the following terse extracts from Mr. Foljambe's paper: "Alcohol offers no relief; we waste $50,000,000 worth of petroleum a year; kerosene only fuel promising immediate relief; low grade fuel carbureters must be devised; there is not sufficient gasoline for any extended term of years."

The impression which the writer carried away from this meeting was that there was considerable apprehension relative to the situation engendered by the high cost of gasoline, that the future was marked with many uncertainties as regards volume and cost, also the character of liquid fuel that might be ultimately employed.

Those that might be further interested in Mr. Foljambe's very interesting paper of 18 pages might possibly obtain a copy of same upon application to C. S. Clarkson, Secretary of the Society of Automobile Engineers, 29 West Thirty-ninth street, New York City.

WESTERN NEW YORK SECTION

On Monday, March 13, in the Rochester Engineering Society, Rochester, N. Y., the Western New York Section held a meeting at which time J. F. Lincoln, vice-president of the Lincoln Electric Company, presented a paper on "Charging Apparatus and Methods." Mr. Lincoln devoted considerable time to the problems of the private car owner charging in his own garage.

Attention is directed to the attached illustration depicting a half-page advertisement, the first of a series being run in the Rochester, N. Y., Sunday newspapers for five weeks, under the auspices of the Western New York Electric Vehicle Section, National Electric Light Association. This development was conceived and executed by the chairman (Henry J. Schneider, 405 Fernwood avenue, Rochester, N. Y.), and the vice-chairman (L. M. Browne, Sager's Electric Company, 30 Carlton street, Rochester, N. Y.), of the Western New York Electric Vehicle Section, who were able to secure contributions of $50 each from six members and a $100 contribution from another member of the Section, making a sum of $400 in all. Mr. Browne advises that, following the first "ad" all electric vehicle interests have been unusually busy, for, as Mr. Browne expresses it, "The advertisement is working on the people."

The gasoline situation is very much more acute than is perhaps generally realized, causing considerable worry to the gasoline car people, and it would seem that it presents a unique opportunity to accentuate the economies of the electric vehicle. Most users of gasoline cars heretofore have not bothered about costs, but the soaring cost of gasoline is causing many to think, and investigate the economies of the electric, resulting in increased electric vehicle sales.

LITERATURE SENT OUT DURING THE MONTH

Follows a copy of a letter sent to electric vehicle manufacturers with reference to the soaring cost of gasoline:

*Subject: High Cost of Gasoline—The Electric's Opportunity*

Gentlemen:

The attached article which has been sent out to several hundred newspapers and magazines may be characterized as the first gun in a campaign calculated to advance Electric Vehicle interests by taking advantage of the situation engendered by the high cost of gasoline.

Undoubtedly, you possess, or could obtain, valuable data on information which you could forward to us for use in additional articles which will be very extensively released to the press in this country and abroad.

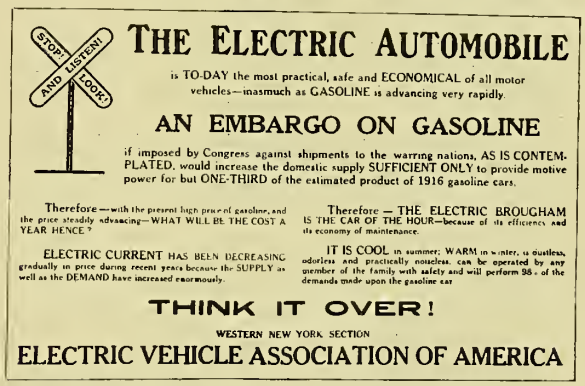
The publicity which we will secure on this subject will be of very considerable value to the Electric Vehicle industry, especially as we are now in a position to obtain the valuable cooperation of Central Stations through our recent affiliation with the National Electric Light Association.

We have an unprecedented opportunity to inexpensively and permanently popularize the Electric Vehicle. Please send us data and suggestions promptly for which accept our many thanks.

Very respectfully yours,

A. Jackson Marshall,
*Secretary.*

As far as the General Office has been able to ascertain, the increasing cost of gasoline represents a




*Reduced Cut of Mr. Schneider's Advertisement.*

very serious problem to the gasoline car manufacturers, and apparently those best informed as to the gasoline situation, advise that the demand is increasing disproportionately greater than the supply and there are uncertainties as to the future volume and cost, and even the nature of liquid fuel (kerosene, etc.) that might be generally employed.

The situation engendered by the high cost of gasoline would seem to offer splendid opportunity to call attention to the economical operation of the Electric. While it has been pointed out that the cost of gasoline represents but about 10 per cent of the total operating cost of a gasoline car, it is likely that the wide-spread indignation and fear caused by the high cost of this commodity will likely cause gasoline car owners to give more careful thought to their total operating cost, something which the average person is usually disinclined to do until the cost becomes burdensome, because it would seem that it is human nature not to inquire too carefully about what pleasure costs. However, if a 10 per cent item causes the condition now found in the gasoline industry, the full realization of the total

costs is likely to bring about an understanding that heretofore the average gasoline car operator did not possess, and electric vehicle manufacturers and others might find it advantageous at that time to effectively present the comparatively low electric car operating cost.

To indicate the seriousness of the increasing cost of gasoline, reference might be made to the fact that in some recent extensive and impartial investigations conducted by the Massachusetts Institute of Technology, it was found that the average 5-ton gasoline car obtained about 3½ miles per gallon of gasoline. With gasoline at 15c, we found the cost per mile for fuel alone would be about 4c and assuming that a truck operates 35 miles per day, the cost of gasoline would be $1.40. With gasoline at 40c, which is freely predicted, the cost per mile would be 11c with a daily cost of $3.85. On the basis of 300 working days per year, the total cost of gasoline would be $1,155. If the daily mileage were increased, as is the desire of all truck owners so that their investment by being more active would bring greater returns, the consumption of gasoline would be, of course, proportionately greater.

If 50 miles per day were covered, the cost of gasoline at 40c per gallon, would be $5.50 per day and $1,650 per year, which emphasizes the seriousness of the possible situation.

The general office is very desirous of securing any data or general information relative to the comparative operating cost of electric and gasoline cars, and other information which might be used in connection with other articles on this subject, which we anticipate releasing frequently and extensively to the press.

Opportunity is taken to advise that in the event that any member of the Association desires to see some publicity issued with reference to any particular phase of electric vehicle activity, the general office would be only too happy to immediately cooperate upon receipt of suggestions, especially if they are accompanied by data or general information that might be employed.

## Used Car Show Postponed

The much discussed used car show, which was planned for this spring by the Chicago Automobile Trade Association, has been postponed for probably a year. On account of the shortness of time after approval was given by the National Automobile Chamber of Commerce it was thought that it would be unwise to attempt to stage the show in May of this year.

## Columbia Production Increased

The plant of the Columbia Axle Company, Cleveland, has been enlarged. Seventy-five per cent more floor space has been added and with the new equipment installed the production of Columbia axles immediately jumps 100 per cent over the former capacity. An interesting feature of the new factory building is a soundproof testing room. Specially constructed walls shut out all sound from this room. The floors and testing racks are of concrete with very solid foundations. Each axle before it receives the final O. K. is tested in this room under the supervision of trained inspectors. The axle is connected to a powerful electric motor and the slightest noise is instantly detected and corrected before the axle is shipped.

## Electric Pleasure Car Radiators

At last the electric has the only obstacle to its winter use removed. Now the electric is far ahead, for electric cars the Lee Electric Radiator Company, Peoples Gas Building, Chicago, Ill., have developed a substantial little radiator that takes its current from the car batteries. It uses about 5 per cent of the current discharge of the average electric pleasure car battery, and diffuses comfortable warmth throughout the interior of the car, without fumes or odors of any sort and without the ever present danger in gas car heaters of petromortis when the exhaust is used as the heat source.

For ladies who own electrics, nothing could be more satisfying than an electric heater. The chill and clammy atmosphere of the electric car in cold weather



*Pleasure Car Radiator in Service.*

is wholly overcome by the use of a radiator. This radiator is set firmly on the floor of the car, and may be attached by screws. It is inconspicuous, being only 6 inches long by 7⅜ inches wide, 15 inches in height, is not in the way, and is a decided comfort. Inasmuch as the electric vehicle requires frequent charging of its batteries, it can fairly be said there is no cost whatever in the operation of a Lee electric radiator in the familiar electric pleasure vehicle.

This size is known as size 10. Its nominal rating is 330 watts at 80 volts. It weighs about 25 pounds and has just one point or degree of heat. The radiating surface is 3 square feet for the two sections, which will heat 3,300 cubic feet of free air per hour. This gives a difference of 170 degrees F. between the car temperature and the radiator.

## J. S. Bretz Denies Rumor

When in Detroit recently J. S. Bretz stated that he was quite surprised to learn that a rumor was abroad, that both he and Joseph M. Gilbert were supposed to be interested financially in the Perlman Rim Company.

Mr. Bretz in a recent communication to Electric Vehicles stated that neither he nor J. M. Gilbert had any connection with the Perlman Rim Company or Mr. Perlman and his rim patent.

## One Hundred Percent Efficiency=24 Hours a Day

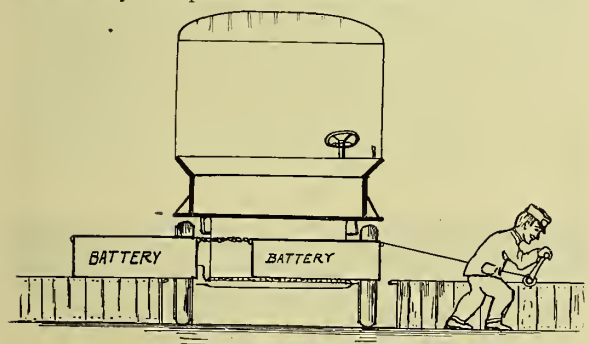
When it is realized that an organization such as the American Express Company has found it pays to scrap a thing unless it is the most economical thing of its kind for its purpose, and it pays dividends to operate or it goes in the discard, then a new light is shed on the recent additional purchases of electrics for the company's Chicago office.

Outside the absolute freedom of repairs and the other advantages of electrics it has found another



*Batteries Zig-Zagged on Platforms.*

way to make its silent burden carriers pay additional dividends. In the distribution of the mass of express matter that clogs up the down town offices due to the restricted package space on the account of its high rental value they have found it necessary to distribute express matter during the night to their branch suburban offices. Their electric trucks now run twenty-four hours a day, six of them being in this heavy duty service. In order to do this the efficient person in charge of the service devised the platforms shown in the half tone which are separated just far enough to let the trucks drive between them. They are the same height from the ground as the bottom of the battery compartment of the electric truck.




*Method of Changing Batteries.*

Charged batteries are kept on the platform to one side while the platform opposite is kept empty. To the rear of each platform is a hand winch, in this case nothing more than a large bar of steel running parallel with the edge of the platform on the ends of which are fastened hand cranks. Attached to the bar are pins to which chains are fastened.

When a truck drives in between the platforms, the battery compartment doors are opened on each side, a chain from the winch is fastened to one end of the exhausted battery tray and a small chain attaches from old to the new. The driver steps over to the winch after disconnecting the terminals and turns it over a dozen times and has his exhausted battery out and the newly charged one in ready to connect; this takes a half minute, he fastens down his battery trays, slams down his compartment doors and drives out in less than ten minutes after entering the garage. He is now ready to deliver American express over another forty miles or so.

## Maryland Truck Bill Causes Trouble

In a letter to Governor Harrington, of April 20, Asa B. Gardiner, secretary of the Motor Truck Transportation Committee, presented arguments why the Bennett bill should not become a law. In the letter Mr. Gardiner says:

"The bill applies to every owner of a motor vehicle to be used in the public transportation of merchandise or freight operating over stateroads, streets, etc. There are several distinct classes of freight trucks.

"1. Private trucks. Of approximately 3,800 trucks in Maryland, over 3,500 are of this class.

"2. The semi-private truck, which may or may not be properly included in this law; for, as drawn, the law is not specific. These trucks are the trucks of the warehouse companies that transport furniture from one house to another house and from one town to another town. Express trucks would come under this classification. There may be as many as 250 of these trucks."

The Bennett Bill referred to bars from the highways of the State trucks with a capacity of more than eight tons. The bill also provides for the increase of all license fees paid by commercial vehicles as follows: trucks with a capacity of not more than one ton to pay $15 a year, those of more than one and less than two tons, $20; $25 for those between two and three tons, $30 between three and four tons, $35 between four and five tons, $40 between five and six tons, $45 between six and seven tons, and $50 between seven and eight tons.

## Cost of Electric-Truck Operation

The accompanying figures on the cost of operating an industrial electric truck were presented by C. E. Ogden, Cincinnati manager of the Walker Vehicle Company, at a recent meeting of new-business managers of Ohio companies:

| | *Per Day* |
|---|---|
| Depreciation at 10 per cent | 34 cents |
| Interest at 6 per cent | 15 cents |
| Tire renewals | 14 cents |
| Battery renewals, lead cells | 40 cents |
| Battery renewals, nickel-iron cells | 28 cents |
| Electric energy at 4 cents | 20 cents |
| Repairs at $10 per year | 4 cents |

These figures were based on 300 days per year use of the truck. The electric industrial truck referred to in Mr. Ogden's paper is considered the successor to the hand truck, and has found a wide field of usefulness in railway terminals, on wharves and in many factories.

## Peorians Get Show Rebates

At the second annual banquet last week of the Peoria Automobile and Accessories Dealers' Association, Peoria, Ill., rebates were paid to the forty-three exhibitors who had booths at the annual show in February. Each exhibitor was paid back his entire deposit for space, the very large attendance making this possible. A balance of $750 was voted for the cause of good roads.

## Freight Handling by Express Organizations

The costly congestion of freight at railroad terminals and steamship terminals has reached such proportions that before long remedies will of necessity have to be evolved. A study of the problem would indicate that railroads and steamships are carrying freight most efficiently between points, but the handling of merchandise to and from and in the terminals leaves much to be desired, stated the secretary of the Electric Vehicle Section of the National Electric Light Association recently.

It therefore appears that changes will have to be effected in the transportation of freight to and from the terminals and in the handling of merchandise in the terminals themselves. While great improvements have been made, much more could be effected in these two phases of local freight handling. It seems to the writer that the full measure of possible success can only be obtained when the local transportation and the handling of freight in the terminals are considered jointly, instead of as two separate and distinct phases. No matter how perfectly developed the method of freight handling in terminals may be, the highest efficiency cannot be obtained unless the movement of freight to and from terminals by trucks be such as will exactly fit into the scheme of terminal operation and vice versa.

It is apparent that the local transportation of freight is unsystematic and very costly. It is hardly necessary to review the chaotic conditions existing in this branch of the work, which seem to get worse instead of better.

Almost everyone is familiar with the losses resulting from the influx and outflow of freight during certain hours of the day at the terminals and the inactivity at other periods, due to the fact that nearly everyone wants service at the same time, which is a physical impossibility to render. The thousands of trucks compelled to wait their turn, pile up a loss that is counted in the tens of millions.

If each truck had a definite time to call for or deliver merchandise to terminals and the schedules were observed, the terminals perhaps operating at night as well as day, delays and losses due to congestion would be reduced to a minimum. Furthermore, trucks and trailers could systematically operate better at night, since they would not be compelled to constantly buck street traffic with attending delays and accidents. Sooner or later the growing traffic of our cities will force the use of streets at night. There is hardly more reason why the streets of our city should not be used at night, especially for the transportation of freight, than there would be to confine the use of railroad tracks to day traffic.

If the existing trucking individuals and concerns could get together and work out a method of systematically co-operating in the development of a scientific schedule of operation, much could be accomplished. Otherwise, it appears that the railroads must either go into the delivery of freight direct from shipper to consignee, or that large and efficient local transportation companies will have to be formed to sympathetically work with the railroads in the elimination of freight congestion with its attending losses. No matter what method or methods may be employed, action, and prompt action, is imperative.

The more thought the writer gives to the subject, the more it appears that organizations possessing the qualifications of efficient express companies would prove to be the solution, for such organizations would have an intimate and practical knowledge of railroading, would understand the receipt and dispatch of merchandise through terminals, have national and international organizations and the connections necessary to the forwarding of freight, and know the local transportation phase of the work. Furthermore, such a development would not be in the nature of an entirely untried experiment, for the transference of express is not so unlike the handling of freight, except that the latter is somewhat more bulky and usually does not move so rapidly. But it is the writer's personal opinion, that the costly congestion of freight could be materially eliminated and far-reaching economies effected, if organizations similar to express companies would go into the business of express freight, possibly operating their own terminals and fleets of motor trucks for local transportation, operating along the same general lines employed in the handling of express.

The idea of national organizations competent to handle the freight business much on the same basis as express has been handled seems to be such a simple solution of the problem that the writer has hesitated heretofore to give public expression to it, fearing that it possessed a weak spot unknown to him which possibly prevented others better informed from having expressed the thought before. However, the idea is advanced for whatever value it may have, and if it is not feasible, the fact will shortly be known. The details incident to such a development could be worked out if the main thought is acceptable.

## Advertising with Post Cards

To widen the usefulness of its new garage, the Greenfield (Mass.) Electric Light & Power Company is distributing souvenir post cards illustrating on one side the garage exterior and on the other a section of the switchboard with charging panels for electric vehicles. The cards emphasize the day and night service available for electric-vehicle tourists and commercial cars, and are given to patrons and others in a position to pass the word along that the company is maintaining these facilities.

Taking his observations throughout the Eastern territory which he covers as Eastern sales manager for the Anderson Electric Car Company, makers of Detroit Electric cars, E. H. Chase, Jr., foresees in the coming spring one of the biggest waves of prosperity that the motorcar business has ever experienced. All of the earmarks of a big business growth are in evidence from Savannah to Boston, in the opinion of Mr. Chase. The situation in Baltimore is extremely promising.



*Well Lighted Interior of Chicago Electric.*

## A Million Electrics by 1926

Some months ago it was published throughout the United States that Thomas A. Edison made the statement that within a short time there would be more electric current sold for the charging of storage batteries in electric vehicles than was now being consumed for house lighting purposes.

Later, Dr. Charles P. Steinmetz, the electrical wizard, made the statement that within the next ten years over a million electric cars would be sold. These prophecies at the time they were made seemed impossible even to many of those who were closely allied with the industry, as the character of the electric car made at the time these statements were offered seemed to prohibit the realization of these prophecies. However, the character of the electric car is rapidly changing. Its mileage and speed have been increased and its price greatly reduced, while its general quality of excellence has been maintained.

This fact is in evidence when the Detroit Electric is considered. Every energy and vast amounts of money are being expended by this progressive Company in manufacturing a car which will fulfill the prophecies of the great Edison and Steinmetz.



*Charles P. Steinmetz in his Detroit.*

Dr. Steinmetz who believes in making his actions suit his words is now using a Detroit Electric for town purposes, as he not only finds it the most comfortable means of conveyance but the most economical.

In a recent statement to Electric Vehicles D. E. Whipple, Chicago branch manager of the Anderson Electric Car Co., stated that he believed more electric motor cars could be sold if the salesman would only see and grasp some of the every day opportunities to make a sale. "Why," he said, "even the much maligned weather is a talking point. Do you realize that in 1915 the weather report shows that there were 130 days on which it rained or snowed, and only 109 clear days, the balance, of course, being cloudy or partly cloudy. The average for the past twenty years shows 125 days per year on which it rained or snowed and 116 clear days per year.

"When we analyze the average automobile owner's requirements, and take into consideration the number of rainy, snowy and cloudy days in every year, which leaves only 116 clear days per year, during the past twenty years, and then realize that during these 116 days per year the average business man is supposed to work six or eight, or more, hours per day, he has but little time to use his gasoline automobile in clear weather, and when he is working during these 116 clear days, his investment in his gasoline automobile is idle, unless he has in his employ a chauffeur.

"The electric is a serviceable utility automobile for 365 days in the year, regardless of weather conditions, and when the average business man is attendeding to his business, his Detroit Electric is not idle for the reason that his family can use it, they can drive it without worrying about starters, carburetors, magnetos or spark plugs.

"I will not attempt to elaborate on the sales argumentive possibilities that can be developed pertaining to the subject of weather conditions affecting the purchase and use of an automobile. I have roughly given you my idea and you can work out for yourself the possible sales arguments in connection with this subject.

"I have experimented in connection with these argument and find them to be interesting to the prospective buyer and successful to the extent of getting results, which is what we are all after.

"The average salesman is surrounded by thousands of such examples which are passed by unnoticed."

## Law Requires New Dimmer Type

California has made a law practically requiring headlights to be permanently dimmed on state or public highways, and prescribes that the center rays must not strike the ground further than seventy-five feet in front of the automobile. The lower part of the headlight is covered with "lamp frosting" up to the level of the center of the electric globe, and this cuts out the rays that shine upward, and only permits the free passage of the downwardly directed rays from the upper half of the reflector. The lamp must be properly focused. This arrangement gives the full power of the light on the road, but does not dazzle approaching drivers. This method of dimming is directly contrary to the usual practice, in which the upper half of the lamp glass is frosted.

Agitation for another law is also pending regarding the maximum weight of trucks allowed on the highways. It is intended to limit them to ten tons at the present, with a maximum speed of eight miles an hour for that weight.

Edison Storage Battery Company branch-office managers and salesmen gathered at the company's factory and main office in Orange, N. J., recently for the annual sales meeting. H. G. Thompson, vice-president and general sales manager, presided. The reports of the various salesmen showed a healthy condition throughout the industry and marked important developments made by the Edison storage battery. The success of the Hartford Electric Light & Power Company, using the Edison storage battery service system, and the fact that the company was able to charge lower rates than charged by any other company was pointed to as information which should be more clearly brought to the attention of other central stations interested in securing off-peak load.

The Pennsylvania Rubber Company, Jeannette, Penn., did about $4,000,000 worth of business during 1915 and realized earnings that were the most satisfactory in the history of the company, according to the report presented to the stockholders at their annual meeting. Increases in the sales of both the new ebony tread tire and the well known vacuum tread have necessitated increasing the plant and an output of 2,000 tires daily is to be reached shortly.

## Booklet on Charging Stations Issued

The 1916 issue of the electric automobile charging station booklet, published by the New York Electric Vehicle Association, Irving Place and 15th street, is being distributed. It contains a complete list of all charging stations in New York City and those of some 70 towns within a radius of a hundred miles of City Hall, together with the maximum amperage and voltage available, the hours during which service is available and the prices charged for boosting at all of the stations listed. There are two route maps, both on a large scale, one of New York City and the other of suburban runs, with the charging stations shown. There is an interesting and instructive chapter on auxiliary charging or "boosting," with a table of constant current boosting rates.

Perhaps the most notable feature of the booklet is the story it tells of the constantly decreasing price of electricity for battery charging. Year by year the trend has been constantly downward, until at the present time the maximum rate of the New York Edison Company is eight cents a kilowatt hour, which tapers down to one cent a kilowatt hour, according to the amount of current used. The lowest New York rate is that of the Edison Storage Battery Company at 206 West 76th street, which is charging six cents per kilowatt hour. Outside of New York the Fairbanks Electric Company have the advantage, at five cents per kilowatt hour. The electric garage established about a year ago by the New York Electric Vehicle Association, at 62nd street and Central Park West maintains passenger electric automobiles at a flat rate of forty dollars a month, including storing, cleaning, washing, polishing and charging with an unlimited amount of current. Typical garage rates in New York City for commercial electric automobiles range from forty-five dollars a month for a 1,000 lb. car to sixty dollars a month for a five-ton truck. These rates include storage, charging, washing, et cetera. This economic advantage is one of the strongest reasons why the future of the electric vehicle looks brighter than ever—particularly when it is considered that the cost of fuel for other types of motor trucks has advanced from fourteen to thirty-one cents a gallon, with the prospect of going still higher and with, it is estimated, from thirty to fifty per cent of the cars idle.

An alternative, according to the handbook, is offered where 1,000 pound trucks are washed, stored for $15.00 a month and then billed for current at 5 cents a kilowatt hour. A five-tonner on this basis, exclusive of charging, would cost $25.00 a month. In these cases, however, the watt hour meter is to be furnished by the customer.



*The Attractive Clean Cut Lines of theOhio.*

## Motor Cars in Venezuela with 53 Cent Gas

The automobile trade in Venezuela has increased wonderfully in the last three years, amounting to approximately $550,000 in that time. Figures were recently given out showing the United States imports during that period were $135,480 in 1913, $127,325 in 1914 and $85,472 for January to June, 1915, with an estimated added importation to the end of the year of nearly $100,000 more. When it is realized that in 1915 every car except one which was imported from Trinidad came from the United States, this record is indeed remarkable, for gasoline is selling at the American equivalent of $0.53 a gallon. The few electrics present are gaining ground rapidly, for other modes of transportation are quite costly, in spite of rapid roadway extensions into the interior, and electric charging facilities are increasing. All the cars, especially the electrics, should get away from the dark colors so prevalent in the States and adopt a brighter and more variegated style to insure quick sales. It has been stated that it is quite necessary to have all wires thoroughly and permanently insulated and all joints taped and shellaced thoroughly, on account of the moisture in the air during the heavy rains of the winter season, which would rapidly corrode and exposed connections.

The American colors are frequently seen in the business districts, indicating American advertised products are in high favor. At present some eighteen manufacturers of American cars have agents in Caracas and the sign "Garage Americano" is a common sight.

**Statement of the ownership, management, circulation, etc., required by the Act of Congress of August 24, 1912, of ELECTRIC VEHICLES, published monthly, at Chicago, Ill., for April 1, 1916.**

State of Illinois, County of Cook, ss.

Before me, a Notary Public in and for the State and county aforesaid, personally appeared Ed J. Mock, who, having been duly sworn according to law, deposes and says that he is the Business Manager of ELECTRIC VEHICLES and that the following is, to the best of his knowledge and belief, a true statement of the ownership and management of the aforesaid publication for the date shown in the above caption, required by the Act of August 24, 1912, embodied in section 443, Postal Laws and regulations, printed on the reverse of this form, to wit:

1. That the names and addresses of the publisher, editor, managing editor, and business managers are:

*Publisher,* Electricity Magazine Corporation, 1251-1256 Monadnock Bldg., Chicago.

*Editor,* Paul H. Woodruff 7025 Yale Ave., Chicago, Ill.

*Managing Editor and Business Manager,* Ed J. Mock, 9345 Pleasant Ave., Chicago, Ill.

2. That the owners are: (Give names and addresses of individual owners, or, if a corporation, give its name and the names and addresses of stockholders owning or holding 1 per cent or more of the total amount of stock.)

Ed J. Mock . . . . 9345 Pleasant Ave., Chicago, Ill.
B. C. Sammons . . . . . Blue Island, Ill.
John Crocker . . . . . Moroa, Ill.

3. That the known bondholders, mortgagees, and other security holders owning or holding 1 per cent or more of total amount of bonds, mortgages, or other securities are: There are no bonds, mortgages or other securities outstanding against ELECTRIC VEHICLES.

4. That the two paragraphs next above, giving the names of the owners, stockholders, and security holders, if any, contain not only the list of stockholders and security holders as they appear upon the hooks of the company but also, in cases where the stockholder or security holder appears upon the books of the company as trustee or in any other fiduciary relation, the name of the person or corporation for whom such trustee is acting, is given; also that the said two paragraphs contain statements embracing affiant's full knowledge and belief as to the circumstances and conditions under which stockholders and security holders who do not appear upon the hooks of the company as trustees, hold stock and securities in a capacity other than that of a bona fide owner; and this affiant has no reason to believe that any other person, association, or corporation has any interest direct or indirect in the said stock, bonds, or other securities than as so stated by him.

ED J. MOCK, *Business Manager.*

Sworn to and subscribed before me this 30th day of March, 1916.

(Seal) Leona J. Ekstrom.

My commission expires Aug. 17, 1917.

# Brevities of the Business

*The Activities of the Electric Motor Car Field Told in Short Paragraphs*

## The McCall Family Scores Again

Friends of Frank E. McCall, until recently electric vehicle engineer in the Contract Department of the Commonwealth Edison Company of Chicago, who is now with the Philadelphia Storage Battery Co. of 1621 Michigan avenue and better known to the E. V. A. men as the secretary of the Chicago Chapter, will be glad to know that his son, Master Robert F. McCall, aged only fifteen months, whose picture appeared above in the Edison Round Table, was awarded a blue ribbon as one of the fifty prize winners in the "Better Baby Contest," in which 1,400 of the finest babies in Chicago were entered by their parents. It was quite an occasion, on March 26, when the relatives and friends of the winning fifty babies assembled on the eleventh floor of the Boston Store, and a number of speeches were made and the prizes awarded. The contest was organized by Dr. A. Lindsay-Wynekoop, Chairman of the Child's Welfare Committee of the Woman's City Club, in connection with National Baby Week. Although only fifteen months old, Master McCall was ranked among the two-year-old babies and still got a blue ribbon. That's going some. Frank McCall is now wearing 48-inch chest measurement clothes.



J. E. Redmond has been made assistant sales manager of the Chicago territory by the Michelin Tire Company, Nilltown, N. J. R. B. Tracy, who was appointed factory representative, will continue to supervise the middle west branches of the company.

A. W. Caney, president and active manager of the Batavia Rubber Company, New York City, and one of the original incorporators, has sold the greater portion of his stock and has retired.

F. W. Suhr has been appointed manager of the New York City tire department of the Firestone Tire and Rubber Company.

J. E. Duffield, Chicago, is now identified with the Mechanical Rubber Company as sales manager. For many years he has been a prominent figure in automobile circles and was formerly with the United States Rubber Company. The company will add several new lines to its already complete one of automobile rubber goods and Mr. Duffield will promote their sale under the trade name of "Usco."

John B. Maus has joined the Fisk Rubber Company of New York. He was for the past two years eastern district manager of the Batavia Rubber Company. Mr. Maus started 10 years ago as special factory representative of the Goodyear Tire and Rubber Company, following which he became New York district manager for that concern. Four years ago he joined the U. S. Tire Company, remaining with it until he joined the Batavia force in March, 1914. With the Fisk Rubber Company Mr. Maus has charge of the export department at the general offices in Chicopee Falls, Mass.

J. C. Milton of 730 Mendon street, Indianapolis, has Waverly for the coming year.

E. S. Firestone, San Francisco manager for the Firestone Tire and Rubber Company, Akron, O., has sailed for Honolulu. He will combine business and pleasure during his absence.

Miss May Brooke, one of the few women selling motor cars, has taken the Detroit Electric agency for Norfolk, Va. She has her office at the Reliance Electric Co., at 131 West City Hall avenue, Norfolk.

F. E. Queeney and E. P. Chalfant have been appointed members of the Standards Committee, Society of Automobile Engineers, with assignment to the Electric Vehicle Division.

W. J. Surre, Erie, Penn., manager of the tire sales department of the Continental Rubber Works, has been elected to the office of second vice-president. Mr. Surre is widely known in the trade, having been at one time sales manager of the Corbin Screw Corporation, selling coaster brakes and other products. He left this company several years ago to join the Continental Rubber Works, where he has made rapid progress.

J. V. Mowe, assistant general sales manager of the Kelly Springfield Tire Company, was in New Orleans recently as the guest of the Southern Hardware and Woodstock Company, local representatives for Kelly Springfield tires. This was Mr. Mowe's first trip to the Crescent City since 1900, and he said New Orleans has taken long strides in the past six years. He was especially impressed with the great improvement that has been made in the way of street paving.

Paul O'Kelley of Atlanta, Ga., has just taken the agency for the Milburn. For several years Mr. O'Kelley was traveling engineer for the Columbus Buggy Company, but in later years he has been best known in automobile circles as one of the most expert electric auto service men in Atlanta. He has been located as manager of the Electric Auto Service Station at 112 Auburn avenue for some time and for the present will handle business for the Milburn company at this place. Mr. O'Kelley is already arranging for a location on Peachtree street, and just as soon as his new electric arrives he declares he has many orders awaiting him.

V. W. Peterson has been promoted to the position of advertising manager of the Stewart-Warner Speedometer Corporation, succeeding Gridley Adams, who has resigned. Mr. Peterson was formerly assistant advertising manager.

George T. Newton, formerly secretary and sales manager of the American Multigraph Company, and one of the original promoters and developers of the multigraph, has joined the sales organization of the Fisk Rubber Company at the general offices, Chicopee, Falls, Mass.

W. H. Piggott has become manager of the Boston branch of the Federal Rubber Manufacturing Company, succeeding Charles Langmaid, who has resigned.

William C. Little has been appointed western representative of the Bearings Company of America, with headquarters in Detroit.

W. D. Kenny recently established the only exclusive electric garage in the west, at Wichita, Kans., with the exception of three branch factory houses that are located in Kansas City. It is the intention of the Electric Garage, at 208 South Lawrence avenue, to keep everything so neat and clean that Milady's car will be returned to her door in perfect order and entirely free from the inevitable grease found in gas garages. It is Mr. Kenny's boast that no gas car will ever enter his door. He will handle the Detroit electric.

W. G. Pierce, of the Pierce Electric Company, of Tampa, Fla., has taken the agency for south Florida of the Detroit Electric. Headquarters for the car will be at the electric garage on Parker street, where Mr. Pierce and his brother have opened a station for electrical repairs to cars.

Johnson Manages Detroit Gibney—Following the resignation of Detroit branch manager H. L. Winter of the Gibney Tire & Rubber Co., O. S. Johnson has been appointed to manage the Gibney interests there. Mr. Johnson was formerly a district manager for the United States Tire Co.

Tibbitts 19 Years with Goodyear—On April 7, E. C. Tibbitts finished his nineteenth year as advertising manager for the B. F. Goodrich Co., Akron, O.

Hess Firestone Cleveland Manager—J. D. Hess, Jr., has been appointed manager of the Cleveland, O., branch of the Firestone Tire and Rubber Co. Mr. Hess spent 3 years as salesman in the Detroit branch of the company.

The Dixie Motors Co. of Evansville, Ind., has taken the agency of the Milburn electric for that territory.

## New Incorporations.

Cleveland, O.: Associated Rubber Company; $150,000; F. J. Donkles, C. H. Olds, A. D. Wismer, R. W. Jeremiah, L. J. Johnson.

Cleveland, O.; Ravenna Rubber Company; $100,000; to manufacture and sell rubber articles; L. E. Yaggi, W. H. Haselman, H. Hill, W. G. Radcliffe, Helen M. Doyle.

Philadelphia, Penn.; Sterns Tire and Tube Company; $500,000; Olin Bryan, H. E. Bryan, Howard B. Frances.

Houston, Tex.; The Modern Tire and Repair Company; $25,000; F. M. Van Brunt, T. E. Armitage, E. E. Patterson.

Denver, Col.; The International Rubber Company is the new name of the Colorado Tire and Leather Company, 985 South Broadway, which manufactures rubber and leather half soles and treads for tires.

Denver, Col.; The Gessler-Williams Tyre Company, agent for Swinehart tires, has moved from 1560 to 1312 Broadway.

Denver, Col.; The Cartwright Tire and Rubber Company is located at 132 16th street. It is exclusive mid-West distributor of Nassau tires.

Chicago: Quick Tire Service Co.; capital stock, $5,000; to manufacture and deal in and repair motor cars and accessories; incorporators, T. P. Edwards, A. F. Miller and E. F. Miller.

Orlando, Fla.: United States Shock Absorber Co.; capital stock, $100,000.

Louisville, Ky.: White Tire Co.; capital stock, $10,000; incorporators, Charles Dobbs, B. H. Plaskett and Emil Van Allman.

Seattle, Wash.: Clark Garage & Repair Shop; capital stock, $4,000; incorporators, J. H. Clark, Hans Hanson, J. H. Gordon.

Columbus, O.: Phelps Mfg. Co.; to manufacture wire wheels; capital stock, $100,000; incorporators, H. C. Phelps, G. R. Hedges, Hugh Huntington, H. R. Tingley and S. A. Hoover.

Cleveland, O.: Electric Welding Co.; to do all kinds of welding and motor car repair work; capital stock, $10,000; incorporators, K. German, James H. Palmer, S. Chester Crobaugh, A. R. Corlett and M. Y. Yost.

Corbin, Ky.: Corbin Auto & Delivery Co.; capital stock, $1,000; incorporators, W. H. Chandler, Q. A. Miles and R. O. Williams.

## Goodrich Board Increased.

At the recent annual meeting of the stockholders of the B. F. Goodrich Company the number of directors was increased from 14 to 18. The new men selected and the person chosen to fill the vacancy caused by the resignation of A. H. Wiggin are: W. O. Rutherford, A. B. Jones, Dr. W. C. Geer, H. E. Joy and H. K. Raymond.

The regular quarterly dividend of one per cent. has been declared on the common stock, payable May 15 to stock of record May 4. The authorized preferred issue was reduced from $28,000,000 to $27,300,000 at the stockholders' meeting.

## Ajax Sells to Employees.

The Ajax Rubber Company, Inc., New York City, announces that the entire block of the new issue of common stock set aside for purchase by employees under the profit-sharing plan arranged by the company and Prichitt & Co., bankers, has been taken up, and that further purchases have been made by the employees in the open market.

The plan provides for the sale of the stock to Ajax workmen at the issue price on installment payments. An initial payment of 15 per cent is required, the balance being in monthly installments, stipulated according to the salary of the purchaser. Subscriptions were received from the company's branches in various parts of the United States.

Akron, O.; Hanna Electric Company will have a service station for Willard storage batteries at 53-55 South High street.

Washington, D. C.; The Jones-Kessler Company has taken the agency for the Marathon tires.

Chicago, Ill.; The Braender Rubber and Tire Company has opened a branch at 1350-54 South Michigan avenue. The branch is in charge of W. J. Heathcock.

St. Louis, Mo.; The Newcastle Rubber Company has been organized to handle the sale of Newcastle tires in Missouri and surrounding territory and will have its headquarters at 3454 Lindell avenue.

Bridgeport, Conn.; Fairbanks Electric, 175 Gannon street, will conduct a service station for Willard storage batteries.

Detroit, Mich.; The H. & H. Garage and Sales Company has taken over the garage and salesrooms formerly occupied by the Grinnell Electric Company at 467 Woodward avenue.

## Business Opportunities

Uncle Samuel is thinking seriously of abandoning his horses now in use at the Macon, Georgia, post office. First intimation of this was the decision of the Macon post office to invite bids on three auto trucks for parcel post delivery and also on a truck for the Macon post office delivery. At the same time bids are being invited on the horse-drawn wagons. The post office delivery contract is awarded only once every four years and unless the automobile trucks are decided on at this time the matter will be deferred for four years at least. July 1 marks the start of the fiscal year of the Macon post office.

Chief McLaughlin, of Norfolk, Va., with the approval of the Board of Control, asked for a fire boat to cost $25,000; a motor truck, $11,000; and two motors tractors, about $4,500 each. No action in regard to the three pieces of fire apparatus was taken but the committee will probably recommend one or more and a motor sprinkler, $3,600.

Oil City, Pa., is contemplating the purchase of a motor fire truck to be bought by the city for the fire department.

At the suggestion of Councilman Clulow of Franklin, Pa., all bids for the proposed motor fire truck were rejected, and council decided to prepare new specifications and re-advertise for bids.

The trustees of Fresno, Cal., instructed the city clerk to advertise for an automatic aerial truck and two automobile pumping engines for the Fresno fire department. The two engines are to be of the first class. The apparatus the city has in view in advertising for bids was in use at the Panama-Pacific International Exposition in San Francisco. In view of the fact that the fire department there was regarded as a model department, the trustees believe that some excellent apparatus will be secured for Fresno.

The turnpike commission of the Davidson County Court of Tennessee opened bids April 1st for the supplying to the county of one auto truck, with oil sprinkling attachment. A number of bids were received. The contract was not awarded, as the members of the commission desire time to carefully compare the specifications of the various cars offered. Their headquarters are at Nashville.

Northampton, Pa., is in the market for fire trucks at the present time.

Mayor George W. Stidger of Kokomo, Indiana, has decided to ask the city council to purchase motor apparatus for fire stations Nos. 2 and 3, as No. 1 is already motorized.

According to the St. Joseph, Mo., *Gazette*, the fire Chief Pat P. Kane thinks St. Joseph should begin to plan for several more motor trucks for the fire department.

The Montgomery, Ala., city commission, at a special meeting decided to purchase an aerial truck and a combination chemical, hose and pump truck, both to be motor-driven. These two pieces of fire fighting apparatus will cost approximately $15,000 to $18,000 and the city clerk, Ed Devinney, was instructed to advertise for bids. The motor-driven aerial truck will have a seventy-five foot ladder, and the combination chemical, hose and pump truck will be similar which is now in service at the headquarters station on Madison avenue. The Montgomery fire department has long felt the need of a station in South Montgomery and while an engine house was built there some time ago by the city, it has never been equipped, but Chief Browder believes that the purchasing of another combination truck with a pump will mean that the station in South Montgomery will be opened.

The Goodyear Tire and Rubber Company, Akron, O., has made the first distribution of life insurance policies to the value of more than $2,000,000. The company believes that life insurance is one of the best means of providing for the future, and furnishes mental security by the men who are protected from want in case of sickness or accident, and know that their families are insured against want. The plan selected provides for all employees in factory, in office and in the company's many branches.

The recently organized Perlman Rim Corporation has already provided facilities for the manufacture of 3,000 sets of demounted rims each week and the danger of the American automobile industry being tied up as a result of the injunction which stopped the activities of the Standard Welding Company has been overcome. The Perlman Rim Corporation, a $10,000,000 organization, has placed L. H. Perlman, who received the patents on demountable rims, in the position of president. His backers include a prominent manufacturer of automobiles and the financial bankers of that manufacturer.

# Voluntary Liquidation Sale

Our complete stock of new Buffalo Electric pleasure cars and one-ton motor trucks, also large stock of wheels, axles, springs, etc., suitable for building either Gasoline or Electric chassis.

*Call or Write*

**Buffalo Electric Vehicle Company**
1219 Main St. BUFFALO, N. Y.

## A Subscription to Electric Vehicles Helps to Solve Your Selling Problems

¶ Send along the name of your prospect, and with the the first copy of ELECTRIC VEHICLES will be sent a card telling that it comes from you and will be a visitor for a year, a monthly reminder of your good will and friendly interest.

¶ If you have one prospect the cost will be one dollar and fifty cents.

¶ One lucky dealer with twenty prospects sent his entire list.

¶ He sold sixteen of them!

**Electricity Magazine Corporation**
MONADNOCK BUILDING
CHICAGO, ILL.

RENT AN

# UNDERWOOD

## TYPEWRITER

It is the simplest in construction, easiest in operation, and deservedly the most popular machine of the day.

The "Just as good as the Underwood" argument, advanced for the sale of other typewriters, sums up all the proof of Underwood supremacy.

"The Machine You Will Eventually Buy"

# VOLKCAR

## Storage Batteries

**They Are Used by the Largest Electric Car Manufacturers in the World, in Chicago and Suburbs**

**For Further Information**
**Ask the Users**

**Volkcar Storage Battery Company**
2437-39 Michigan Avenue
CHICAGO, ILLINOIS



CHICAGO ELECTRIC

# Your Guests

will find in *your distinguished*

# *Chicago Electric*

*The best built Electric in America*

those excelling features, both in its appearance and performance, that will make it their ultimate choice and give it lasting approval

## NEW EDISON MODELS

$1,615 to $2,275

Deferred payments if you desire

## Walker Vehicle Company, Chicago

*Manufacturers of Chicago Electric Passenger Cars and Walker Electric Trucks*

CHICAGO SALESROOM
2700 Michigan Avenue
Telephone Calumet 3000

EVANSTON BRANCH
Telephone Evanston 481
1013-17 Davis Street

# ELECTRIC VEHICLES

A MAGAZINE FOR THE ELECTRIC MOTOR CAR USER. $1.50 PER YEAR. 1253 MONADNOCK BLDG.

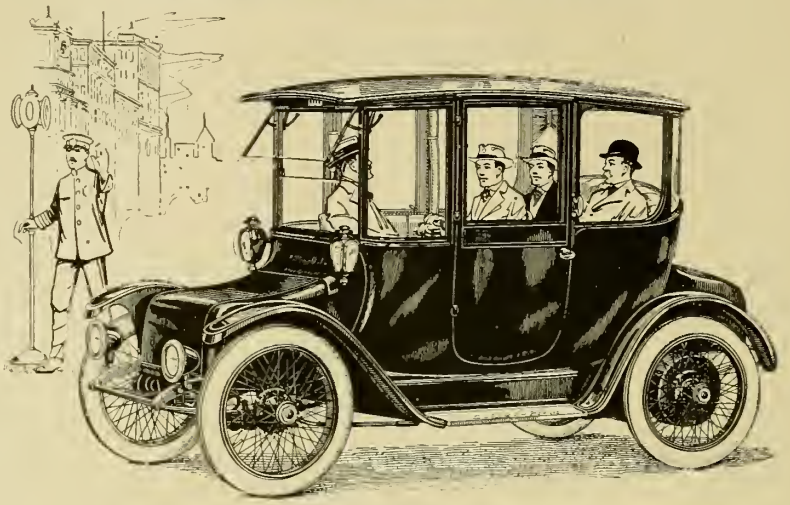
Vol. 8 CHICAGO, JUNE, 1916 No. 6



DETROIT ELECTRIC'S TRIP FROM DETROIT TO GROSSE ISLE AND RETURN ON ONE BATTERY CHARGE

While the cost of gasoline increases
the cost of electric current decreases

# Detroit Electric



## The matchless motor for the modern man

In the modern Detroit Electric are combined all those motor car qualities which keen business men of today deem most desirable: Power, sane speed, availability and economy, together with the luxury, comfort, safety and ease of operation that appeal to all.

**Mileage**—We have developed the batteries of the Detroit Electric till now they insure 80 to 90 miles on a single charge. The Detroit Electric will satisfactorily perform 98% of the demands on a gasoline touring car, but the touring car cannot satisfactorily meet 98% of the electric car's performance.

**Sane speed**—The Detroit Electric now has more speed than the law allows you to use—more than you really need. And you men know what a satisfaction it is to feel that there is a surplus of speed at your command.

**Power**—The Detroit Electric will climb the hills that any car will climb and will pull through heavy mud and sand without faltering.

**Economy**—With the price of gasoline soaring out of sight this is a most important consideration. Take your pencil and check up what you paid for gasoline last month. If you haven't kept a close account it will give you the surprise of your life. The high cost of gasoline has made the gasoline-powered car a too expensive luxury today.

On the other hand the cost of electricity is low and dropping lower. And there's no chance of its taking a sudden rise. You can drive the Detroit Electric every day of the month—get the same mileage you require from your gas car—and pay only about $7 or $8 for your power cost.

Even though you may know that the electric-powered automobile has advanced considerably over the models of a few years ago, still you are bound to be genuinely surprised when you personally investigate the great strides recently made by the Detroit Electric.

**Anderson Electric Car Company**
**Detroit** **Michigan**
***Branches at New York City, Chicago and Kansas City***

(154)

# Philadelphia Diamond Grid

## IMPROVED STORAGE BATTERIES *for* ELECTRIC PLEASURE CARS GIVE

## MORE MILEAGE
## HIGHER SPEED
## LONGER LIFE



MEDIUM PLATES—TYPE 11WMI
150 AMPERE HOURS



THIN PLATES—TYPE 15WTXI
180 AMPERE HOURS

BOTH TYPES ARE BUILT UPON THE
PATENTED Diamond Grid AND
CONTAIN PATENTED PHILADELPHIA LONG LIFE SEPARATORS
LET US SPECIFY THE PROPER SIZE AND TYPE FOR YOUR CAR

*Send for Booklets WI and WTXI*

**PHILADELPHIA STORAGE BATTERY CO.**

ONTARIO AND C STS. PHILADELPHIA

DEPOTS AND AGENCIES

NEW YORK CHICAGO ST. LOUIS WASHINGTON BOSTON CLEVELAND ROCHESTER
PITTSBURG DENVER SALT LAKE CITY DETROIT CINCINNATI BUFFALO
MINNEAPOLIS KANSAS CITY, MO. TORONTO OAKLAND SAN FRANCISCO
SEATTLE LOS ANGELES SACRAMENTO PORTLAND, ORE

**This Trade Mark the Guarantee of Excellence on Goods Electrical**

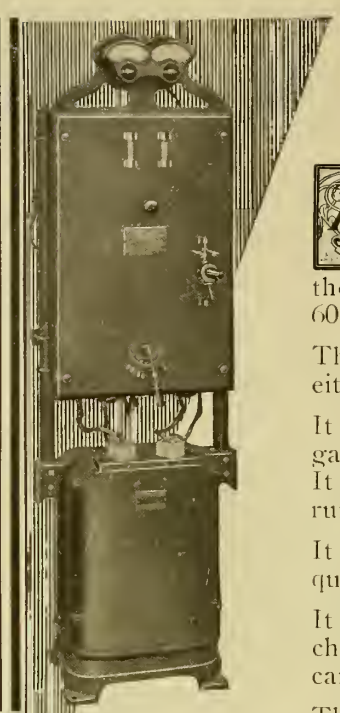
***Address Nearest Office***

Atlanta, Ga.
Baltimore, Md.
Birmingham, Ala.
Boston, Mass.
Buffalo, N. Y.
Butte, Mont.
Charleston, W. Va.
Charlotte, N. C.
Chattanooga, Tenn.
Chicago, Ill.
Cincinnati, Ohio.
Cleveland, Ohio.
Columbus, Ohio.
Dayton, Ohio.
Denver, Colo.
Des Moines, Iowa.
Duluth, Minn.
Elmira, N. Y.
Erie, Pa.
Fort Wayne, Ind.
Hartford, Conn.
Indianapolis, Ind.
Jacksonville, Fla.
Joplin, Mo.
Kansas City, Mo.
Knoxville, Tenn.
Los Angeles, Cal.
Louisville, Ky.
Memphis, Tenn.
Milwaukee, Wis.
Minneapolis, Minn.
Nashville, Tenn.
New Haven, Conn.
New Orleans, La.
New York, N. Y.
Niagara Falls, N. Y.
Omaha, Neb.
Philadelphia, Pa.
Pittsburgh, Pa.
Portland, Ore.
Providence, R. I.
Richmond, Va.
Rochester, N. Y.
St. Louis, Mo.
Salt Lake City, Utah.
San Francisco, Cal.
Schenectady, N. Y.
Seattle, Wash.
Spokane, Wash.
Springfield, Mass.
Syracuse, N. Y.
Toledo, Ohio.
Washington, D. C.
Youngstown, Ohio.

For Michigan business refer to General Electric Company of Michigan, Detroit, Mich.

For Texas, Oklahoma and Arizona business refer to Southwest General Electric Company (formerly Hobson Electric Co.), Dallas, El Paso, Houston and Oklahoma City.

For Canadian business refer to Canadian General Electric Company, Ltd., Toronto, Ont.



A SIMPLIFIED economical Mercury Arc Rectifier for charging batteries ranging from 38 to 46 cells of lead or the equivalent in Edison, from 220 volts, 60 cycles.

This new G-E Rectifier is adaptable to either rapid or slow charging.

It is the ideal outfit for the private garage—charging the electric at home. It is easily operated by anyone who can run an electric car.

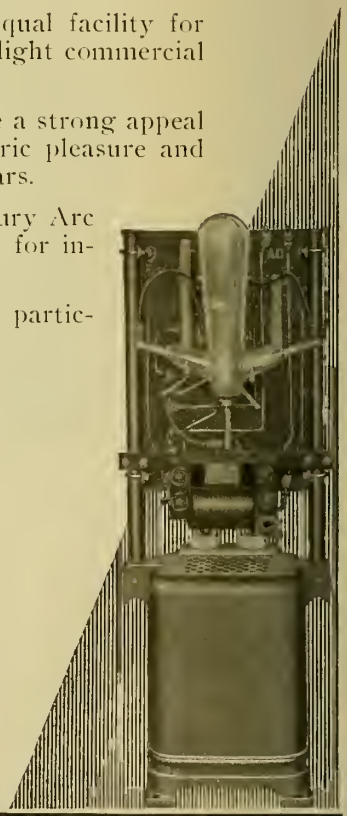
It occupies small floor space and requires no oil or grease.

It can be used with equal facility for charging batteries for light commercial cars.

The above points make a strong appeal to the owners of electric pleasure and about town business cars.

To the Central Station the G-E Mercury Arc Rectifier is always a good proposition for increasing the night load.

Send to our nearest office for further particulars.



**The Moderate Priced**

# RECTIFIER

**for charging electric vehicles**

# General Electric Company

**General Office: Schenectady, N. Y.**

6216

Published Monthly By
ELECTRICITY MAGAZINE CORPORATION
Monadnock Building
CHICAGO

Entered at Chicago Post Office as Second Class Mail Matter

# ELECTRIC VEHICLES

WITH WHICH IS INCORPORATED IGNITION
TRADE MARK REGISTERED IN THE UNITED STATES PATENT OFFICE

SUBSCRIPTION PRICE
Domestic - $1.50
Canada - - $1.75
Foreign - - $2.00

FOR SALE AT ALL NEWS STANDS

If Your News Dealer Will Not Supply You—Please Notify Us

Volume VIII | CHICAGO, JUNE, 1916 | Number 6

# Thirty-Ninth Convention of N. E. L. A.

*Opens Brilliantly at Chicago*

THE Thirty-ninth Annual Convention of the National Electric Light Association, the biggest one of its kind and the most beautiful one yet held, opened Monday evening, May 22, with a splendid reception at the Hotel Congress. Tuesday morning most of the delegates registered; to all indications some six thousand people will be present before the end of the week. The Auditorium Theatre, the seats boxed over for the occasion, presented a pretty sight with its flowers and decorations and lighting effects when the exhibition was thrown open. The Electric Vehicle Section attracted more than its share of attention through its extensive exhibits.

As one entered the doors the Beardsley Light Coupe exhibit from California was to the left, while next to it the two Ward light delivery cars of Mount Vernon, N. Y., emphasized the national character of the convention. Across the aisle the light Milburn electric held sway with the Walker Vehicle of Chicago and General Vehicle chassis of New York. Further to the left two beautiful Detroit Electrics were shown. Numerous accessory and battery manufacturers had booths which, with the car exhibits, will be described in full in our next issue.

## Electric Vehicle Section Papers Program

FIRST AFTERNOON SESSION

Wednesday, 2:30 p. m., Masonic Hall Auditorium. Mr. Walter H. Johnson, Chairman; Mrs. E. S. Mansfield, Vice-Chairman.

| *Starting Time* | *Duration Minutes* | *Subject and Author* |
|---|---|---|
| 2:30 | 20 | Chairman's Address, Walter H. Johnson. |
| 2:50 | 20 | Secretary's Report, A. Jackson Marshall. |
| 3:10 | 10 | Treasurer's Report, H. M. Edwards. |
| 3:20 | 30 | Reports of Section Activities: New England, Chicago, Philadelphia, Washington, Cincinnati, San Francisco, Los Angeles, Pittsburgh, New York, Detroit, Cleveland, Toronto, Denver, St. Louis, Kansas City, Portland, Western New York. |
| 3:50 | 15 | Report of Constitutional Revision Committee, Frank W. Frueauff, Chairman. |
| 4:05 | 10 | Report of Membership Committee, Joseph D. Israel, Chairman. |
| 4:15 | 15 | Report of Standardization Committee, E. R. Whitney, Chairman. |
| 4:30 | 10 | Report of Motion Picture Film Committee, Carl H. Reed, Chairman. |
| 4:40 | 15 | Report of Traffic & Good Roads Committee, A. H. Manwaring, Chairman. |
| 4:55 | 25 | Report of Insurance Committee, Day Baker, Chairman. |
| 5:20 | 10 | Appointment of Nominating Committee. |
| | 180 | Minutes. |

FIRST MORNING SESSION

Thursday, 10 a. m. Mr. Walter H. Johnson, Chairman; Mr. E. S. Mansfield, Vice-Chairman.

| *Starting Time* | *Duration Minutes* | *Subject and Author* |
|---|---|---|
| 10:00 | 20 | Report of Legislation Committee, P. D. Wagooner, Chairman. |
| 10:20 | 30 | "Relation of Tires to Efficiency of Electric Vehicles," S. V. Norton. |
| 10:50 | 30 | Report of Federal and Municipal Transportation Committee, James H. McGraw, Chairman. |
| 11:20 | 30 | "Industrial Truck Applications," C. W. Squires, Jr. |
| 11:50 | 25 | "Electric Truck Troubles and How to Eliminate Them," F. E. Whitney. |
| 12:15 | 30 | "Greater Garage Service," Harry Salvat. |
| | 165 | Minutes. |

SECOND AFTERNOON SESSION

Thursday, at 2:30 p. m. Mr. Walter H. Johnson, Chairman; Mr. E. S. Mansfield, Vice-Chairman.

| *Starting Time* | *Duration Minutes* | *Subject and Author* |
|---|---|---|
| 2:30 | 30 | Joint Report of Operating Records Committee, W. P. Kennedy, Chairman, and Report of Garage and Rates Committee, George B. Foster, Chairman. |
| 3:00 | 20 | Report of Central Station Co-operation Committee, E. S. Mansfield, Chairman. |
| 3:20 | 30 | "Battery Service—A Unit in a Comprehensive Plan for the Successful Exploitation of the Electric Vehicle." |
| 3:50 | 30 | "Passenger Vehicle Problems and Activities," E. P. Chalfant. |
| 4:20 | 45 | "Central Station Promotion of Electric Vehicle Use," W. P. Kennedy. |
| 5:05 | 10 | Report of Nominating Committee. |
| 5:15 | 15 | Nominating of Officers. |
| | 180 | Minutes. |

Adjournment.

## A Third of a Million Miles on Solid Tires

"If you wish to know why you should consider the electric with more favor than any other car, call up any of the owners on my list and ask them what they think of the service their cars have given them and what they think of them today after they have covered an aggregate of 337,547 miles," said Gail Reed in a



*Gail Reed, Sales Manager of Chicago Electrics.*

recent interview. Here's the list with the mileage readings taken January 31, 1916:

| | Miles |
|---|---|
| P. L. Deutsch, 5057 Drexel Blvd | 23,686 |
| S. W. Strauss, 444 E. 48th St | 49,300 |
| Sidney Mandl, 433 Deming Pl | 24,243 |
| John K. Seifert, 5416 Hyde Park Blvd | 18,845 |
| Miss Bernice Wren, 4930 Michigan Ave | 28,605 |
| J. W. Moses, 5109 Ellis Ave | 26,678 |
| G. W. Stewart, 5649 Winthrop Ave | 26,943 |
| J. S. Hummer, 4535 Beacon St | 23,477 |
| L. H. Crawford, 5211 Greenwood Ave | 21,060 |
| F. K. Lawrence, 5484 Hyde Park Blvd | 24,963 |
| Miss T. O'Neill, 3822 Gladys Ave | 25,117 |
| W. T. Foster, 534 E. 34th St | 25,161 |
| Mrs. E. Elpin, 4836 Michigan Ave | 19,469 |

"They are all Chicago electrics by these are only a few of the hundreds of electrics that have made like records. This is the strongest possible evidence that our construction will not fall down or wear out through continuous use of solid tires. We recommend solid tires first, last and all the time, for we know that the modern electrics are of such honest construction that they will continue to serve their owners with utmost satisfaction for years and years.

"The first use of solid tires in the history of automobiles was on the streets of Chicago and the first men to start the construction for the use of such tires were the engineers responsible for the Chicago Electric. The name "Chicago Electric" means more to electric car purchasers today than ever. They are realizing the benefits of carrying their transactions on direct with the manufacturers. The Walker Vehicle Co., builders of Chicago Electrics, entire plant is located in Chicago where the finest facilities for service from every standpoint, are available. The Chicago Electric typifies the spirit of advancement responsible for the growth of the city in which it is produced. It is the accumulative achievement of years of scientific study and experience.

,"In the design of the new Chicago Electric special pains have been taken to develop the most efficient brake equipment. Too strong emphasis cannot be placed on the importance of most dependable brakes. One of the features of the Chicago Electric brake equipment is a powerful hand brake attached to the control lever, located in the most accessible position for instantaneous use. By means of this brake, a ten foot stop can be made by the gentle pressure of the hand. Traffic conditions are growing more congested every day and all drivers of motor cars realize that it is of the utmost importance that the safety of the occupants be not jeopardized by awkward or inaccessible brakes. The hand brake equipment on the controller system of the Chicago Electric is claimed to be the simplest and safest on the market and this point alone has been responsible for the sale of many of these cars."

---

## Detroit, Michigan New Service Plans

The pay-for-what-you-get plan as adopted by a number of electric garages is proving a success and, as the name implies, is a system whereby the owner of an electric pays for each class of service separately.

This method has proved an agreeable one to gasoline car owners, and although it is not a new idea to the electric garage, it has never been used as extensively as at present.

With this system, for example, there is a specified charge for delivering or fetching the car from 40 to 60 times a month. This charge is about $8, with a deduction of 20 cents for each time under 40, and a charge of 20 cents for each time over 60. The charge of the amount of electric current used per month is specified also, depending on the rate charged for electric service by the electricity supply station. General care of the car per month is rated at about $20, which includes washing, polishing, cleaning of upholstery and the other incidental attentions that an electric requires.

There is an extra charge for dead storage when the car is laid up for 10 or more consecutive days. A driver can be employed, if the owner so desires, at the rate of 50 cents an hour, the owner assuming all responsibility. This plan, aside from being feasible and practicable, is just. Each owner pays for the service received, whereas with the use of the flat rate system the charge is not always equitable, considering the service rendered.

In the long run, the pay-for-what-you-get system is proving more economical than the flat rate charge to the majority of car owners.

This plan is proving quite satisfactory to several Chicago garages and their patrons where individual meters are installed. It is generally referred to as the Continental system.

---



*Fleet of Baker Electric Trucks of St. Louis Board of Education.*

# Tires for Industrial Trucks

*A Product Made Necessary in the Last Five Years and Its Perfection*

IN response to the increasing demands for "more efficiency" in every department of progressive American industry, the electrically-driven industrial truck has been developed to supplant the slow-moving, man-powered hand truck in transporting materials at railway stations and steamship docks, and in factories and warehouses. The practical solution of this important transportation problem—in the coming of large capacity, high-speed, electrically-operated industrial trucks, has been a development of only the last half dozen years. They are being produced to fill a growing need in industrial transportation, quite distinct from that of gas and electrically-driven commercial trucks on streets and roads. The field of industrial track manufacturing is still in its infancy, but it is one that is witnessing a remarkable development. Industry, considered as a composite whole, has been quick to recognize the factors of economy in increased efficiency in the product, and in order to provide for the increasing demands, the building of industrial trucks is being given increased attention by the big manufacturers. Many new and soundly established factories have been organized within the last few years to build industrial trucks exclusively. Among the makers we find these firms:

Atlas Car & Manufacturing Company, Cleveland, Ohio; Automatic Transportation Company, Buffalo, N. Y.; The Buda Company, Harvey, Ill.; The Elwell-Parker Electric Company, Cleveland, Ohio; Galion Dynamic Motor Truck Company, Galion, Ohio; General Vehicle Company, Long Island City, N. Y.; C. W. Hunt Company, Inc., West Brighton, N. Y.; Lakewood Engineering Company, Cleveland, Ohio; The Lansden Company, Inc., Brooklyn, N. Y.; Mercury Manufacturing Company, Chicago, Ill.; Orenstein-Arthur-Koppel Company, Koppel, Pa.; Sequoia Motor Car Company, San Leandro, Cal.

Before industrial truck tires are described in detail, as to construction, dimensions, application, it seems proper to dwell more fully on the field of the industrial truck and its possibilities. A concise statement of one truck manufacturer is to this effect: "They reduce time, labor, cost of production; they increase output, shipments and profit." Railroad systems, notably the Pennsylvania, preceded the great industrial plants in applying the electrically-driven truck to bring about maximum efficiency in handling the immense increases in freight, baggage, express and mail matter. Among the industries and enterprises in which industrial trucks are giving efficient service may be mentioned: railroad passenger and freight terminals, docks, fruit packers and shippers, wholesale dry goods establishments, warehouses and factories of various descriptions, foundries, flour mills, cold storage plants, mail order houses, cotton and woolen mills, breweries, tobacco factories, packing houses, department stores, printing plants and paper mills.




*In Left Center, Truck Built by Automatic Transportation Co., Buffalo; Right Center, Type Produced by Elwell-Parker Co., Cleveland.*

Truck manufacturers, in their endeavors to evolve types of trucks applicable to the particular demands of each industry, are placing a variety of types on the market. There are two general classes, in the specifications of most makers—one, a tractor designed only for hauling loads on trailers, the other a machine carrying its own load. Of the load carrying machines, two distinct types of frames are offered by the makers, the so-called "straight frame" and the "drop frame" types. Modifications of each type of frame have been worked out in order to adapt the truck most satisfactorily to the class of service in which it is intended to be used, whether railway, marine or general industrial work.

While the trucks differ materially in appearance, the manufacturers aim to embody the same mechanical and electric details in them, thereby simplifying renewal of parts, etc. The average capacity of the load carrying trucks is from one to two tons, and for railroad service the two-ton size seems to be about the standard. For peculiar conditions met with in certain fields of industry, notably sheet iron, structural iron

and wire mills, a special type of electric tractors and trailers has been evolved. The mechanical points, tires used, are generally the same as in the other types. An interesting feature of the mechanism of electric tractors as developed by some manufacturers after very



*Sprague Electric Truck at New York Pier Equivalent in Efficiency to Twelve Hand Trucks.*

exhaustive tests, is the automatic circuit breaker. This is designed to break the connection whenever the draw-bar strain imposed on the motor exceeds a fixed point. This insures a protection to motor, battery and tires that will readily be appreciated by users.

The prospective buyer is naturally interested in the proof of the superiority of electrically-driven industrial trucks over the old time, cumbersome hand-truck methods, so out of place in this new era of industrial efficiency. On this point a few striking extracts from letters to several manufacturers are quoted:

"Saving is being made of about four or five men."



"Each truck has replaced two horses and two men."

"Easily move with one truck going with load a distance of 600 feet and returning same distance empty, 150,000 board feet of rough lumber, 'an average of 1,000 board feet to each load in a 10-hour day.'"

"Save from three to five men per truck per day in handling raw and finished products in a steel mill."

"Able to save in boiler room exactly $8.00 a day in labor."

"Economy effected will pay for truck in approximately one year."

"Save 15c a ton in handling brick."

Throughout the south, it is stated on authority, cotton handling at the ports has been revolutionized by the use of industrial trucks. Instances are known of a 50 per cent to 75 per cent expense lowering; of one electric truck and one man equalling ten hand trucks and ten men. One railroad points to a saving of 11 cents a ton, or 35½ per cent, in freight handling at a large terminal through change from hand to electric trucks.

In order to turn out a successful product, industrial truck manufacturers have called on the manufacturers of electric batteries, motors, worm drives, rubber tires and other important accessories, to furnish parts especially designed for this new class of trucks. Chief among the concerns to enthusiastically respond to this appeal from the industrial truck makers was The B. F. Goodrich Company. Pioneers in the truck tire industry, it has also earned credit for furnishing the first practical steel-base industrial truck tire—within the last five years. From the very first it has been the policy of the Goodrich organization to co-operate with the industrial truck manufacturer in his efforts to produce the very best type of construction possible. The selection of the right kind of tires for use in industrial transportation is an all important consideration. The fact that this company has from the first led in the volume of industrial truck tire output, is the result of offering a superior product, and further, a constant willingness to work with truck manufacturers in meeting their varied and exacting specifications for industrial truck tires.

It is a fact well understood by the manufacturers that in order to build a mechanical truck that in all details will represent maximum utility to the user, unusual care must be exercised in the selection of the more important accessories. The functions of solid rubber tires placed on the wheels are to secure traction, cushion the load, and protect the mechanism and electrical parts from shocks and jolts. In order to meet these requirements the tire must be of the best construction to insure longer truck life, and a maximum return on the investment.



*Galion Dynamic Motor Truck at Plant of Hudson Motor Car Co., Detroit, Mich.*

The same rubber carefully compounded to resist

abrasion and wear that distinguishes the regular and De Luxe types of truck tires specified for commercial trucks, is to be found in the industrial tires. The sides of the tread form a duplex curve, a Goodrich feature that provides fully for displacement of the load under pressure. By this combination of compound and contour high resilience is afforded, and this is a most important factor in reducing the strain on battery equipment. These refinements consequently effect a notable reduction in current consumption.

In many mills and warehouses the industrial trucks must operate over rough, uneven surfaces. If the tire is of low resilience, obstructions in the path of the truck are encountered and passed over only at the expense of wasted electrical energy. The high efficiency of the tires prevents any such waste of energy. The current is thus solely employed in furnishing driving power. The durability and toughness which characterize good motor car tire treads, perpetuate the life of tire and truck to the utmost. Care in manufacturing has resulted in the construction of a tire that is light in weight, yet extremely durable. This combination reduces the dead weight of the wheel to the lowest point compatible with strength and safety. In this connection it is significant that, after a comparison of operating costs extending over two years, one of the largest eastern operators of industrial trucks decided to change over all other makes of tires to this type of tire design.



*Orenstein-Arthur Koppel Co.'s Electromobile Carrying Two Thousand Five Hundred Pounds of Lead and Pulling Same Amount on a Trailer, in Operation at the Plant of Hoyt Metal Co., Granite City, Ill.*

The foundation of the industrial truck tire is a base of special steel, lathe-turned and hand-machined, so as to provide dove-tailed grooves with sufficient overhang to afford permanent anchorage to the hard rubber sub-base which is forced into these grooves. A comparison of these Goodrich refinements with the ordinary methods of steel base and rubber sub-base joining will at once suggest the high perfection attained along this line—a perfection resulting from years of practical experimentation and large outlays of money. This is but another illustration of the policy of putting nothing but the very best product on the market. An irregular wave line, forming the upper surface of the sub-base, increases by 10 per cent the area of contact between the hard rubber and the tread, thus resisting those forces which, transmitted through the tire, tend to cause separation at the base. Special care is taken in producing a steel base that will assure the most perfect fit when applied to the cast steel wheel. It is desirable to have the tire applied to the wheel permanently by means of a steel-to-steel drive fit. This is best accomplished by accurate machining of the outside surface of the wheel. A pressure of not less than 15 to 25 tons is employed in application of tire. Goodrich industrial truck tires are all of the pressed-steel-to-steel drive on type—a direct fit between the base of the tire and the rim of the wheel without use of intermediate band or accessory metal parts of any description. Once properly fitted, these tires will cause the operator no further concern until worn down so that they no longer cushion the load. By reason of the very distinct superiority of the pressed-on type, the B. F. Goodrich Company has discarded the old demountable type for this service.

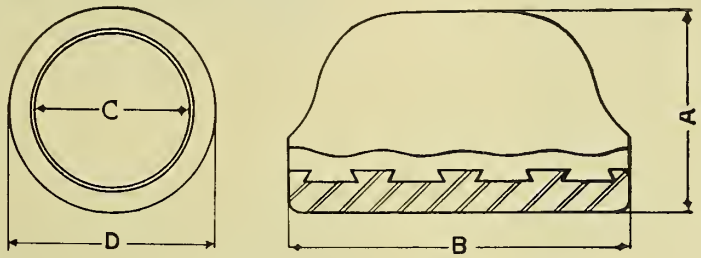
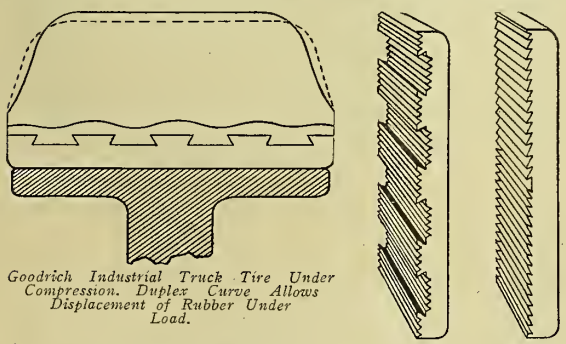



*Diagram Showing Dimensions for the Truck Tire Table.*



*Goodrich Industrial Truck Tire Under Compression. Duplex Curve Allows Displacement of Rubber Under Load.*

While the Society of Automobile Engineers has recently established a standard of wheel dimensions for industrial truck tires, it will require some time for this standard to become fully effective. The rapid development of the industry as well as the demands of the truck and accessory manufacturers will make this imperative. The B. F. Goodrich Company recognizes the need and advisability for such a standardization in manufacturing practice and is co-operating toward that end. A start was made during the last year by the committee on industrial trucks of the Association of Railway Electrical Engineers. It is interesting to quote one paragraph of the committee's report on this subject:

"There is at present a wide range in tire practice among manufacturers of industrial trucks, your committee having found 31 sizes between 10-inch and 27-inch diameters. The committee's recommendations

reduce this number to 5. The principal reason for this diversity of sizes is in the various depths of tread now existing. Your committee has found that the 2-inch depth of tread lasts from one to four years, depending upon the character of service. Your committee believes, therefore, that the 2-inch depth of tire made up from a high quality compound which reduces the rolling resistance and cost of truck and battery maintenance, is therefore preferable to a deeper tread, which to sell at the same price must be made of a poorer quality of rubber, which would increase the rolling resistance and cost of operation of the trucks."

While it recognizes the advisability of standardization, the B. F. Goodrich Company, in the interest of the various industrial truck manufacturers, is prepared to furnish tires for the customary types and sizes of wheels in use. As noted in the foregoing report, it is considered that in actual practice a tire of 2-inch tread rubber is fully adequate to answer all tire-wear and cushioning demands of most industrial trucks now manufactured.

Because of the prime importance of the rubber tires in controlling the operating efficiency of an industrial truck, making for a maximum length of truck life and giving the proper cushioning to the delicate me-

| Size of Tire | Height A | Width B | Inside Diam. C | Outside Diam. D |
|---|---|---|---|---|
| 16 x3 | 2 " | 3 " | 12 " | 16 " |
| 18 x3 | 2 " | 3 " | 14 " | 18 " |
| 20 x3 | 2 " | 3 " | 16 " | 20 " |
| 24 x3 | 2 " | 2⅞" | 20 " | 24 " |
| 10 x3½ | 2 " | 3⅜" | 6 " | 10 " |
| 5 x3½ | 1⅞" | 3½" | 11¼" | 15 " |
| 16 x3½ | 2 " | 3½" | 12 " | 16 " |
| 20 x3½ | 2 " | 3½" | 16 " | 20 " |
| 20 x3½ | 2½" | 3⅜" | 15 " | 20 " |
| 21⅝x3½ | 1⅛" | 3½" | 17¾" | 21⅝" |
| 24 x3½ | 2 " | 3½" | 20 " | 24 " |
| 24 x3½ | 2¾" | 3⅜" | 18 " | 23½" |
| 27¼x3½ | 1⅞" | 3½" | 23½" | 27½" |
| 28 x3½ | 2¾" | 3½" | 22 " | 27½" |
| 16 x4 | 2 " | 4 " | 12 " | 16 " |
| 18 x4 | 2 " | 4 " | 14 " | 18 " |
| 16 4½ | 2 " | 4½" | 12 " | 16 " |
| 27¾x4½ | 2⅛" | 4¼" | 23½" | 27¾" |
| 10½x5 | 2 " | 5 " | 6½" | 10½" |
| 15 x5 | 1⅞" | 5 " | 11¼" | 15 " |
| 20 x5 | 2 " | 5 " | 16 " | 20 " |
| 21 x5 | 2¾" | 4⅞" | 15½" | 21 " |

chanical and electrical parts, unusual care should be taken in the selection of tires. The foregoing sections have outlined the exacting demands from tires in industrial truck service, and how the many refinements of industrial truck tires are combined most efficiently to meet these requirements. The facts presented should be of vital interest to every owner, operator or prospective buyer of industrial trucks. It is interesting to compare the points of various tires on the market when you believe that the man who invests money in tires to secure the maximum returns from his investment will see the wisdom of specifying a good industrial truck tire on his truck when purchased, and for renewals.

## Electrics in the Province of Quebec

Montreal, Quebec, has just exactly eight electric cars if the returns of the Automobile Bureau of Provincial Revenue is to be believed. In the whole Province of Quebec there are only thirteen electrics, while there are only 9,261 gas cars including trucks, which is not such a bad case for electrics when it is realized that they are all charged at home.

## He's Not a "Porch Climber" But He Can Climb

No, this is not a porch climber.

There are, no doubt, more people in Toledo proficient in porch climbing, than in the stunt of climbing steep steps with an electric car, as is shown in the accompanying illustration.

This feat of mounting the steps of the Toledo Art Museum and then quietly running his car back down the jerky incline was accomplished by H. H. Dennis, of The Electric Sales & Service Co., in a new Detroit Electric.

Mr. Dennis had several friendly discussions with Toledo motorists in regard to the relative flexibility



*H. H. Dennis on the Steps of the Toledo Art Museum.*

and performance ability of an electric in comparison with a gas car.

The electric car distributor told one of his gas car enthusiasts that he would climb all over the Toledo Art Museum steps with his electric and that it couldn't be done with a gas car.

To prove his claim, Mr. Dennis drove his electric up and down the Art Museum steps several times, but the gas car fan decided he would rather try Water street hill with his machine and he backed down, courteously extending the palm to the electric. He said for attending church, art museum and other social and business functions that required climbing long flights of steps, he could readily see that the electric had it all over the gas car and he conceded it was good for country touring and hill climbing, too.

---

The twenty-first annual convention of the National Wholesale Liquor Dealers' Association, held in Louisville, May 9, 10 and 11, brought out an interesting fact in connection with the automobile industry. Local automobile dealers made a canvass of the convention, which was attended by wine pressers, distillers and wholesalers from all over the United States. The inquiries developed that the liquor industry in the United States has spent not less than $25,000,000 for motor trucks and automobiles, and that the annual replenishment cost is not less than $20,000,000. It developed that deliveries of wet goods are largely made with power vehicles. The purchases are from the small cars, for the use of salesmen, the electric for the owner and manager, to the biggest and most expensive trucks for the delivery of the product.



*Beardsley Electrics Lined Up for the Start of the Tour on Saturday, April 15. They Carried Over One Hundred Passengers.*

# The Lure of the Open Road

## *Californians Open the Touring Season*

SO long has the electric vehicle been considered as only a town car that its worth for country tours has been greatly underestimated. In California, the land of sunshine and flowers, cross-country tours by electric vehicles, especially in such cities as Pasadena and Los Angeles, have long been in popular favor. Motorists all over are finding California's lure unusually strong during 1916. The famous good roads throughout the length and breadth of the state have proved a paradise for the electric motorist, and the additional rewards and attractions provided by the Panama California International Exposition at San Diego



*Beardsley Light Electric at Hotel Virginia, Long Beach.*

are influencing hundreds of spring travelers. As a part of the Exposition's motor demonstration field where daily tests and special events were inaugurated May 20, a bronze button is being given every automobile driver who travels more than 500 miles to the Exposition. One Exposition entrance is open to automobile drivers at a nominal admission, and free parking space for the electrics is provided on the grounds.

The Beardsley Electric Company, of Los Angeles, has successfully staged a number of runs, a recent one being from Los Angeles to Riverside and return.

On Saturday, April 15, thirty-five Beardsley electrics, possibly the largest gathering of one make of electrics ever assembled for a tour, left from the salesrooms of the Beardsley Electric Company for a run to Long Beach. These cars, driven by their owners, and accompanied by over one hundred guests, merrily spun over rolling hills and out beyond, on the broad county highways for which Southern California is so justly famous; through the rich agricultural section whose products are known in every land; past walnut orchards, orange groves, dairy farms and alfalfa fields, and on roadways lined with blooming roses reflecting the radiant touch of nature's master-hand, and down to the towering bluffs upon which has grown the beautiful city of Long Beach, overlooking a broad expanse of the quiet Pacific. Here a banquet was served at the Hotel Virginia to the guests by Volney Beardsley, after which a dip in the briny deep was indulged in by young and old alike.

Much interest was manifested in a new model Beardsley known as the light town car, perhaps the lowest-priced electric built in America, selling for $1,285. It was predicted by the builders that this economical car would be able to maintain its position along with its larger brothers and sisters and it fully lived up to all the claims made for it. Each car averaged over 70 miles on the trip, and from the fact that they were driven by owners, many of whom could boast of more than three-score years and of whom over two-thirds were ladies, it can no longer be doubted that the electric vehicle has become a unique factor in the enjoyment and pleasures of those who desire comfort and ease of operation, combined with sturdiness and road qualities.

The party left Long Beach at four o'clock and the return trip was made in under two hours and all of the members of the party reached home in ample time for dinner. Not a single mishap occurred and every car finished the run on its own power.

Such tours as this are but forerunners of many

that are planned for the coming summer, and it is prophesied by the native sons that the California builders of electrics will again set a record that the eastern manufacturers will have difficulty in beating.

## "Sociability Run" and Contest Held in New York

Electric pleasure car owners in New York City had a day of their own on May 19 when the New York Electric Vehicle Association's "sociability run" took place. The run was planned with the object of encouraging sociability among the hundred or more women drivers of electric automobiles in New York and of demonstrating the practicability of the electric car for long runs.

The start was made at 2:30 p. m., from the Electric Garage, Central Park West and Sixty-second street, the cars then proceeding up Riverside Drive, through Van Cortlandt Park and Westchester to the Siwanoy Country Club, Bronxville. Invitations were sent by the New York Electric Vehicle Association to all owners of electric pleasure cars in Manhattan and the Bronx.

One of the features of the run was a competition in the form of a secret time contest. The distance covered was approximately forty miles. Three judges made the run in their own cars before the day of the contest, each one noting the total time in which he made the run. The average of these records was obtained and was used as the secret time for the run. The contestant coming nearest to driving the car over the route in the secret time was awarded a prize. All that the contestants had to gauge their time by was the approximate speed in miles per hour which they were told to make.

## A Remarkable Trip to Kankakee

On April 30, Geo. A. Fortin made another cross-country trip worthy of notice when he drove from Chicago to Kankakee, Illinois, a distance of seventy miles from start to finish in three hours and forty minutes on one charge in a Model 57 Detroit Electric.

About three miles from Kankakee he encountered a bad piece of road. A hill is being cut down and graded and as the work was going on, it was necessary to go over an almost impassable stretch of broken up clay. The rains made it quite soft and slippery, nevertheless the car rolled over just as if it had a fresh charge. This was a remarkable test for the car after it had gone over 67 miles of country roads.

Upon arrival at his garage at 151-9 Station street, Mr. Fortin stated that th moltmeter on the car registered 86 volts and the specific gravity of the cells read 1175.

## Rochester to Buffalo and Return

There was no worry about the high cost of gasoline in this cross-country run made by L. M. Browne, of Rochester, who drove the Detroit Electric which is the "Pilot Car" in a record tour of five electrics that covered 164 miles in a two-day trip. At 9:45 on Monday these five electric automobiles left the Powers hotel at Rochester for Buffalo on the first annual trip of the Rochester Division of the Electric Vehicle Association of America.

It was a gay quintet that rolled into Buffalo over the improved roads of Caledonia and Batavia to be met at the Clarence clubhouse of the Buffalo Automobile club by President George C. Diehl and Secretary Dai Lewis and a squadron of electrics which brought them to Buffalo.

Purple and scarlet pennants, blue and white flags designated the fleet. With Mr. Brown in the pilot car, a handsome Detroit brougham, was W. J. George, factory representative of the Detroit Electric. An aristocratic Detroit roadster was manned by Henry J. Schneider, who, by the way, is the chairman of the Western New York Division of the Electric Vehicle Association of America. C. H. Dryer drove an R. & L. roadster, a neat four-passenger car; a Babcock Electric was piloted by W. B. Bowie; and a smart Detroit Electric was driven by Charles H. Rohr.

In Rochester the fleet was escorted to the city line by the official car of the Rochester Automobile Club. These ardent advocates of the electric car all attended an important meeting of the Electric Vehicle Association of America held in the tower room of the Buffalo General Electric building on Monday evening. Important papers were read on the subjects of storage battery problem construction and maintenance and a broad advertising campaign for electrics was discussed, which should cover Western New York. There were 14 delegates from Rochester. Tuesday the Pilot car made its return trip to Rochester. L. R. Brown and the other four cars left the Buffalo *News* building on Tuesday afternoon at three o'clock. They arrived at Four Corners at 6:33 o'clock, making a run of 81 miles in three hours and 33 minutes on one charge of electricity. The drive was made without a stop and the average was 23 miles an hour.

"A shorter run will be made next year," said Mr. Brown, "and a large number of electrics will be entered for we find this one of the most practical ways of demonstrating the efficiency of the electric car for touring and long distance performance. The road from Buffalo to Rochester is ideal now, the only rough spot encountered is around Scottsville."

Mr. Brown is vice-chairman of the Western New York Electric Vehicle Association and is enthusiastic in his belief that the electric car has "come into its own." Manager G. B. Pratt, who was the host of the Rochester delegation, says that the past season in Buffalo and vicinity has broken every record for sales.

## Henry Ford has an Electric for His Own Use



*This Illustration Shows Mr. Ford About to Enter His Detroit Electric, His Fourth of That Make, to Drive to His Estate in the Country.*

# Electric Vehicles' Question Box

*A Service Department for All Readers*

*There are many owners or prospective owners of electric automobiles desiring questions answered and information of an unbiased nature. Electric Vehicles, through these pages, will endeavor to answer questions of any nature pertaining to the electric automobile, its care and operation. The answers will be given as fully as possible and based upon our interpretation of the questions. We assume no responsibility as to results. Our position is merely to help all to the end of securing the very best results from electric automobiles, therefore correspondence is invited.*

**P. J. D.—I have just purchased an electric automobile which is being cared for in a public garage. It is my desire to keep same at home as my garage is finished. What charging outfit do you advise?**

To answer your question we must know the size of cells and number in your battery. Also alvise whether direct or alternating current is available, giving voltage. If current is alternating, give cycles thereof. Perhaps the makers of your car have equipment especially fitted for the battery.

**A. W. N.—Which is the most approved method of checking battery charging, i. e., by voltage reading or by testing the acid?**

The specific gravity reading of the electrolyte (acid) of the battery by means of the hydrometer is the only accurate determination of the state of charge of a battery. Voltage readings at best are only approximate. All battery instruction books give explicit data on this point.

**H.—Indianapolis.—One electric car owner in this city charges his battery only after it has been totally run down. Sometimes ten days elapse between charges. Is he doing justice to his battery?**

The owner certainly is not treating his battery fairly and cannot expect much capacity from it. After a battery has been more than one-half discharged and is allowed to stand for any length of time sulphating of the plates starts, thus causing a loss in capacity. The frequent charging of a battery is best and most economical in the long run. Have your party give his battery a good long charge at say 8 amperes—he will notice a difference at once.

**H. H. H.—Dallas, Tex.—What do you consider the life of an electric automobile?**

Ten years is considered a very fair estimate. There are many electrics in operation today which were built in 1904 to 1908 and outside of body design they look good and render excellent service. The very fact that owners continue the use of the older models indicates the upkeep cost is not prohibitive.

An article cannot be considered worn out as long as it performs satisfactorily and the upkeep costs do not soar beyond reason.

The vehicles built within the last three or four years should last more than ten years, as the chasses are built of better materials, bushings and anti-friction bearings are used at every wearing point. Bodies being built of aluminum are stronger and will not check or crack as did some of the wood bodies. Further, since the "later day" bodies are larger and more uniform in design, in years to come they should not look so antedated as do some of the cars look now which were built years ago.

Another point to consider is the great improvement in pneumatic tires. Hundreds purchased electric automobiles with solid or cushion tires, because the pneumatic tires at that time were subject to frequent punctures and blow outs. The solid or cushion tires were not so pleasant to drive over rough streets or country roads, and they worked undue hardships on mechanical parts. Today manufacturers supply "cord pneumatic tires" which are efficient, of long mileage, rather hard to puncture and will not blow out.

**D. W.—Kansas City.—I have an electric automobile with a transmission and the gears are noisy. Would you recommend the renewing of the gears?**

Your gears can be renewed but our suggestion would be to have some local electric repair shop see what could be done about rewinding the motor or changing the gear ratio of the rear axle so as to eliminate the necessity of a transmission. An electric motor of sufficient size and proper characteristics will pull an electric automobile over hills such as are regularly used by traffic, so that speed change gear sets are not needed.

**A. R.—Springfield.—What would you suggest my doing to increase the speed of my old electric automobile which now makes only 17 miles per hour on top speed?**

We should know the make of your car, the size and number of cells in the battery, the car's weight, and if, when new, it made more than 17 miles per hour. You should see that your car is equipped with efficient tires suitable for electric automobile service, and that all parts are working freely.

To increase the car's speed is never recommended. The designers thereof make calculations as to motor and battery equipment, taking into consideration certain weight, speed and load factors, and changes should not be made unless all conditions are fully understood.

**J. W. S.—Glen Falls.—Is it necessary to remove the rubber stoppers from the cells when a battery is on charge?**

The removal of one or two plugs only is all that is necessary unless you find the solution to be low and a refilling necessary. The rubber stoppers have small vents in them which permits the escaping of the gases. Where the battery is divided half front and half rear, we suggest the removal of a plug from each half, thus making sure they are alike.

**F. E. P.—Altoona.—When purchasing my electric the question of steering was talked of but I could not get the wheel steer installed. What are the usual arguments pro and con?**

Very few wheel steer electrics have ever been sold. Some concerns have furnished them but we understand the percentage to be small indeed. The "lever" steer is used, first, because the speed of the car is never excessive and by now you have probably found your car to be easily controlled under all conditions. Second, the lever can be thrown up out of the way when

one is taking their place in, or leaving the car. With wheels it is generally necessary to slide under them, thus making it awkward, particularly for women. Third, in heavy traffic short, quick turns can be made easily with the lever, a wheel requires much energy. Fourth, the control system in its entirety can be handled much better in connection with the lever.

**N. J. B.—Lansing.—How many "amps." has a forty-two cell 15 plate lead battery? The battery is made by a Philadelphia storage battery company.**

By "Amps." we presume you mean ampere hours. The Philadelphia company makes a 15 W T X plate improved which gives about 178 ampere hours at the six-hour rate.

## A Safety Device for Electric Vehicles

Despite the care exercised by trained drivers, the switch on an electric truck is occasionally thrown in while the controller is off the neutral point. This act has caused not only property damage, but occasionally personal injuries.

The fact that this accident hazard existed led the Eastman Kodak Company, which operates a fleet of electric trucks, to develop a safety device to prevent such an accident, states H. E. Ackerley in a recent issue of the *Electrical Review*. The mechanical engineering department of the Kodak company has just completed the installation of the device on its trucks. With this mechanism the switch cannot be operated when the controller is off the neutral point. The device has not been patented, as the designers wished any one caring to do so to take advantage of it, either in building new trucks or in equipping those now in use.

The accompanying illustrations show one of the devices mounted in a box similar to a driver's seat in the rough. The photographs are taken from the front. The driver sits at the left-hand side of the box, operating the control lever (B) shown in Fig. 1, with his left hand. The rheostat selector shaft (A), to which

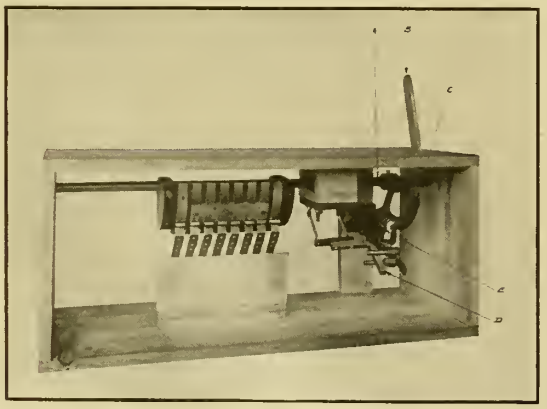


*Fig. 1.—Main Switch Open and Pawl Disengaged.*

the controller lever (B) is attached, also carries a sector (C) which prevents the operator from engaging the switch except when the selector is at the neutral point. A lever (D) has been attached to the main switch from which the handle has been removed. This lever has a pawl (E). There is a slot in the sector (C) through which the pawl (E) on the lever actuating the switch must pass in order to close the switch. The sector (C) is so located that when the switch is closed. the rheostat selectors are all at the neutral point. As

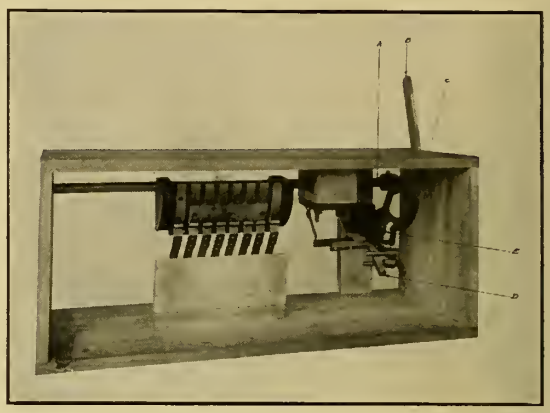


*Fig. 2.—Main Switch Open, Switch Arm Partly Disengaged, Sector Not at Neutral Position.*

the pawl (E) is held forward by a pressure spring, the switch lever can disengage the switch at any position of the selector.

## Automobile Accident Records

According to the best statistics, the number of automobiles in the United States increased from 200,000 in 1909 to 1,750,000 at the end of 1914. The number of deaths attributable to automobiles rose in the same period from 632 to 2,623, or an increase of 775 per cent. However, statistics indicate that the proportion of fatal accidents to the number of automobiles is decreasing, indicating that the drivers of automobiles are becoming more skilful and more careful. Of these fatalities, said the *Scientific American*, a noticeable proportion occur at railway crossings, and for these the victims can only blame themselves, for the necessities of the majority of automobilists are not so pressing but that they can spare enough time at a railroad crossing to insure their own safety.

The majority of other accidents occurs in cities, and there is no question but too many city drivers attempt to maintain too high speeds. Undoubtedly the walking public is extremely careless—even stupid; but this does not free the automobilist from the obligation to drive his heavy car with caution, especially when it is considered that a speed that would insure freedom from accidents only amounts to the loss of a very few minutes in a day.

It has been frequently noted that accidents seldom happen when the driver is riding alone, and the inference is drawn that when he has passengers he "visits" with them, thus having his attention diverted from his duties in guiding and controlling the machine. There is still another situation that has not been mentioned, and that is the petty minded man who wants to "show off," or worse still, who thinks it funny to frighten his passengers by taking risks that he would not think of doing when alone. Such cases are but too common, and it is a pity that there is not a psychologic recorder that will expose such people and lead to a revocation of their licenses.

# Electric Passenger Vehicle Problems and Activities

*Address Delivered at the N. E. L. A. Convention 1916*

BY E. P. CHALFANT

FOR reasons which are to be discussed in this paper, the electric pleasure car industry has failed during an existence of fully sixteen years to develop any substantial growth in volume or in prestige. Whether or not it will continue to exist, or has a logical reason for existing as an industry, constitutes an issue which can no longer be postponed, for it has undoubtedly been postponed for a period of years.

If the electric car is entitled to recognition, why are its annual sales not substantially greater than they were a decade ago? Why has it not shared the world-wide popularity and enormously increasing growth in sales of the gasoline car? Why is it that with an equal start in 1900 when it was problematical whether the car of the future would be propelled by electricity, steam or gasoline, the latter type has grown to an annual product of a million cars, while the electric has never exceeded a total of 5,000 cars in any one year? Statistics show that 1,425 electric cars and trucks were built in 1904 which was 6.6 per cent. of that year's production of all motor cars. This increased to 3,826 in 1909, equalling 3 per cent of the total product for the year, and our maximum was reached in 1913 when approximately 5,000 electric pleasure cars and 3,000 trucks were manufactured, the former representing about 1¼ per cent of the total pleasure car production for that year. The percentage for 1916 has dwindled to a mere fraction, despite the fact that the electric, through organized and constructive effort, has shown an amazing improvement in popularity and performance, and is reaching into communities where it has hitherto been unknown.

What is responsible for these conditions? What is the one big obstacle that has retarded the growth of the industry, or has it been a multitude of small obstacles? And when named, are they surmountable, or must we resign ourselves to the fate that finally overtook the steam-driven automobile, petering out to a small living for one concern, selling a dwindling product to a few cranks who will accept nothing else.

Satisfactory answers to these all-important questions will determine the future growth of the industry.

### HARMFUL OPTIMISM

Let us look this situation square in the face. Let us set aside those foolish dreams built on prophesies attributed to a few well-known electrical experts, that "the car of the future is the electric;" that "a million a year is within reason;" that "shortly electrics will tour the country at will;" that "the electric of the future will sell for $500." Some of these statements, when repeated, hold our industry up to the ridicule of the vast army of users of gasoline cars; others retard our growth and expansion, by persuading many of those who incline to electrics that the real electric has not yet arrived, whereas we are in fact producing today in minutest detail the type and size of car the experienced users of electrics *themselves demand.*

Let us abandon the idea that the Lincoln Highway is being built in order that electrics can tour from coast to coast, and get right down to the problems to be solved in order that we may come into our own where we belong, as a town and suburban car. When the electric becomes a touring car, central stations will not supply the motive power.

Let us work intensively the field which rightfully belongs to us and not waste our efforts and our restricted means tilling barren soil. Why delude ourselves into thinking we can convert that part of the public who never will and never should buy electrics. There are plenty of people who do need and will buy them if we concentrate our educational work upon them.

### WHAT THE FUTURE HOLDS

There are in the United States 54 cities exceeding 100,000 population, each of which should absorb 100 electrics per annum. There are 59 cities between 50,000 and 100,000 which should each take 50. There are 133 cities between 25,000 and 50,000 entitled to 25 cars each. There are 350 cities from 10,000 to 25,000 which can readily use 10 each.

This totals 15,225 cars per annum without including a host of small towns where electrics are gaining a foothold.

From another viewpoint, these 598 cities have a combined population of 34 million, nearly one-third of the entire population of the country, and if we sell in the proportion of one electric to every 2,000 people, it reaches the satisfactory total of 16,975 cars.

When we get right down to "honest-to-goodness" business, our real job is to sell these 17,000 electrics, because the 328 manufacturers of gasoline cars do not contemplate they will be crowded out, nor will they convert their plants to the manufacture of $500 electrics.

### THE QUESTION AT ISSUE

This brings us back to the vital question—What is the one big problem?

In the effort to get an impersonal answer, I have corresponded with over fifty different men in nearly as many different parts of the country, men who have for years fought the battles of our industry and won a living from it.

There have been fully as many reasons as there have been replies; but they are excuses and accusations rather than reasons, and with probably a few exceptions they are local and easily surmountable. In their proper order, I will present and analyze them, but they are secondary to the main issue.

For a period of twelve months ending September, 1915, I worked amongst the dealers throughout the country who sell electric pleasure cars, studying their local problems with them and aiding them to organize for bigger and better business, for profit and for harmony.

After completing their work in sixty of the principal cities of this country, I have gained a fairly accurate understanding of what each one *imagines* to be his problems and I have arrived at the conclusion there are two fundamental reasons why the electric car has not come into the popularity to which it is entitled.

The first reason is the failure of the manufacturers to properly educate the general public regarding the wonderful utility of the electric.

The second reason is the failure of the central station to make it easy to own and operate the electric, by an adequate distribution of charging and boosting stations.

The indifference of the central stations to the fact that every dollar spent in advertising the sale of cars contains fifty cents spent in advertising the sale of current, can be equalled only by the indifference of the manufacturers toward convincing the central station officials that their aid in installing outlying and suburban charging and boosting facilities will encourage suburbanites to buy electrics and town owners to drive them to country clubs, parks and resorts.

These two subjects dominate all others, and are entitled to separate discussion.

### EDUCATING THE PUBLIC

The chief reason why electrics are not in greater vogue can be attributed to the lack of knowledge on the part of automobile buyers, actual and prospective, of their fundamental properties and potentialities. The electric of twelve years ago, with a speed of 10 miles an hour and a radius of 25 miles, did much to create a general—and to an unfortunate extent still existing—impression that the electric is limited in utility.

And what have we really done toward an organized effort to educate the public concerning the utility of the electric?

To the owner of an electric its operation and care are infinitely simple, but to the rest of the world it is a mystery and a problem. To the average mind, electricity suggests scientific and mysterious means for creating motive power; actuated by pressure upon a button which any one can do; as dangerous as lightning should it get beyond control, and requiring the aid of an electrical engineer should the flow of current cease. Ninety-nine per cent of the owners of gasoline cars will tinker the motor, the transmission or the rear construction into working condition when they go wrong, but once his ignition, his magneto, his dynamo or even his wiring gives trouble and he seldom tinkers—he goes for the nearest telephone and calls for an electrician. I have owned and driven gas cars for twelve years, and I speak from experience.

The gasoline car dealers have branded the electric as a car for the aged and infirm and for the women, and because that is a market they did not want themselves we have accepted it, and we advertise and teach our dealers and their salesmen to talk luxurious appointments, upholstery to match gowns and liveries, coach work and finish beyond compare, a past record for building carriages and buggies, and we build up an atmosphere of ultra-refinement and picture our cars in front of palatial residences and in private parks. It is all wrong and we have deserved the

false position in which we have heretofore allowed ourselves to be placed. Why create the impression one must be a millionaire to own an electric?

The electric of today is a practical, economical and efficient motor car, capable of performing fully 95 per cent of the demands made upon the gasoline car, but that little 5 per cent stands up in the sky like a steeple on a church, having just about as much relation to the every-day requirements of the car as the steeple has to the requirements of the church, *but the possibilities of that extra 5 per cent sell a million gasoline cars a year.*

Let us teach the public in sensible, forceful and convincing language what constitutes the 95 per cent of usage and utility which the electric will perform equally with the gas car.

Let us above all prove the truth that the gas car falls far short of measuring up to 95 per cent of the demands made by the purchaser of the electric.

And what are the advantages comprised within this 5 per cent which cause this overwhelming disparity in the volume of sales?

They can be condensed into the one word SURPLUS and whether it refers to power, radius, speed, energy or fuel, it is a known and powerful factor, and wields a controlling influence over the decision of the purchaser who is usually thoroughly informed concerning the construction and the performance of the gas car, but through lack of instruction knows practically nothing of the corresponding attributes of the electric.

However, we will classify and weigh the importance of these subdivisions of SURPLUS, with particular reference to the service demanded of the *enclosed body car*, the popularity of which as a distinct type, or as an addition to the "stable" containing the touring car, is growing by leaps and bounds.

First, there is the ability of the gas car to tour at a rate of 150 miles or more a day for weeks at a time, taking its passengers with reasonable comfort and considerable entertainment over long stretches of interesting country, with no concern for rough roads or steep grades, and with the knowledge that gasoline depots and capable repairmen are always within call.

A decade ago the touring radius of a car meant vastly more than it does today.

The daily dust of a thousand passing cars, the extortionate rate of inn-keepers, the punishment to the fine expensive car and the big repair bill at the end of the journey, in order to restore the car to its normal condition, have all contributed long since to take the joy and enthusiasm out of touring. Today, the experienced motorists content themselves with a trip of a day or two days in easy stages to the summer resort at the springs, on the lake, or river, or at the seashore, where the remainder of the summer vacation is spent in greater enjoyment than is afforded by a kaleidoscopic view of the country.

Short trips of this nature can be and are made by the modern electric car with greater comfort, though with less speed.

The *ability* to tour rather than the *desire* lends importance to this advantage of the gasoline car. When battery developments and improvements permit a radius of 150 miles on a single charge for the electric, the question of distance will seldom come up for discussion.

Next there is the week-end trip, 50 to 75 miles out and back on Saturday afternoon or Sunday during the fine weather —to the hills, the shore or to a neighboring city. Admittedly this has its attractions, but they are attractions which appeal to the vast army of owners of cheap and medium-priced cars, to families of restricted means who depend upon week-ends and holidays for their outings. It is a form of recreation seldom sought by owners of limousines and broughams, for the intercity journeys *they* make can be accomplished equally as well and in very little more time by the electric.

In all comparisons between electric and gasoline cars, it must be remembered that the electric is universally an *enclosed car*, and should be contrasted as to price, quality, utility and serviceability—not with the touring car—but with the limousine, landaulet or sedan of the same seating capacity.

In the past, most people have contrasted the price of the electric enclosed car with that of the gas touring car, which is manifestly an unfair basis since it does not take into consideration the necessarily greater cost of building the enclosed body. Inasmuch as gas car prices are accepted as marking a standard, it is interesting and instructive to analyze the prices of representative makes of gasoline sedans and broughams as listed in the January number of *Motor*. In several instances the extra charge for the body alone amounts to as much or more than the price of a complete electric which is equipped with the finest enclosed body that skill and money can produce.

Then comes the question of speed. The maximum speed of the electric is about 25 miles an hour, which equals the legal limit on suburban roads, and exceeds it within the city boundaries. The speed of the gas car is limited only by the courage of the driver or his passengers. Every motorist knows perfectly well, however, that he rarely exceeds 25 or at the outside 30 miles an hour unless in cross-country driving on fine roads, that the traffic officer and the motor cop will regulate his city driving, and that touring at speed is an expensive punishment to the car and its mechanism; neverthelss he is strongly influenced by a desire for speed sufficient to throw dust on the first driver who attempts to pass him on the road.

When it comes to the average use by the average city man, driving from his home to his office and the return trip, it is an undeniable fact that the electric car will get him there first, not only because its short wheel base enables it to thread its way quickly through traffic, but its instant control and response permit quicker stopping and get-away than is possible with the more ponderous gas car with its slowly accelerating motor.

Now we come to the strongest advantage the gas car offers, that of sustained speed on up-grades. The reserve power of the gasoline motor coupled with its speed-gear changes enable it to negotiate the stiffest grades at a satisfactory rate of speed, for dropping back to a lower gear will increase the speed of the motor, without necessarily decreasing the speed of the car.

The absence of gear reductions in the electric makes it compulsory to obtain increased power on grades at the expense of speed, or else to maintain the speed by an abnormal draft on the battery capacity. The expedient has been employed of shunting the current on grades in order to maintain speed, but it materially diminishes the mileage radius of the car and is not considered good practice. Therefore, until the progress of the art discloses some new method for maintaining speed on grades without sacrifice otherwise, the gas car will retain this acknowledged advantage.

The remaining point in favor of the gas car is the ability to purchase gasoline for motive power, somewhere within every square mile in the country, added to which is the convenience with which it can be poured through a funnel into the supply tank, and the motorist gone again after a momentary delay.

Now let us weigh this apparent advantage against the difference in cost of power used, and the time consumed in renewing it.

There was a time when gasoline cost but 10 cents a gallon. About that same time it required ten hours to re-charge the cells of an electric, at an average of 8 cents per kilowatt hour for current. Since then gasoline has advanced in most localities to a price above 30 cents a gallon, and it is said to be on its way to 50, while electrical juice has declined to an average of 5 cents per kilowatt hour. Today the constant potential charging system will bring the battery up to two-thirds of its capacity in an hour and a half—a lunch time boost for instance—while a full charge requires but three hours. The ordinary charging station requires about six hours, and the motor generator set or the mercury arc rectifier installed in a private garage requires but little more.

We will next compare the cost of power, placing the daily mileage of each type at the conservative figure of 35 miles a day—1,000 miles a month. Statistics show that current for electrics averages $8.50 per month. Let us assume that an enclosed gas car, with six cylinder motor of average power rating consumes gasoline at the rate of 8 miles to the gallon (the average is considerably lower) at a cost of 30 cents per gallon and the expense for the month is $37.50, over four times the cost of current. Nor does this take into account the same proportionate expense for oils, greases and general repairs.

Can it be truthfully said that these problematical advantages which are responsible for the enormous volume of gas car sales can be seriously regarded as outweighing the distinctive benefits of the electric car when used in the field where a gasoline enclosed car would be used?

Fix the following points firmly in your mind.

The electric requires no chauffeur. This practically eliminates joy-riding with its entertainment expense. Its moderate speed prevents road abuses, doubles the life of the car, cuts tire and repair bills in half, and creates a lower percentage of depreciation. There is an absence of noise and vibration from the motor. The gasoline motor requires almost daily attention and adjustment. The owner of an electric does not see its motor from one end of the year to the other. The gas car has many exposed levers—parts that are dirty or oily, the electric has none. The enclosed gas car is insufferably hot from the motor and exhaust pipe in the summer, the electric is scientifically ventilated, and is absolutely free from heat, smoke, odors, and power transmission noises. It does not require anti-freezing compounds in winter, has no balky self-starter to irritate you in cold weather, has only about 15 per cent of the electrical ap-

paratus and wiring that is equipped to the modern gas car, creates no nervous disorders, and can be safely driven by every member of the family over fourteen years of age. There is but little to learn and less to watch, and danger is practically eliminated. When the electric is kept in your private garage it requires no expert attention.

The foregoing indisputable statements prove two convincing arguments in favor of the electric:

First—That purchasers of enclosed cars who do not and never will require surplus power are more efficiently and economically served by the electric.

Second—That owners of the high-powered touring cars who require and demand surplus power enjoy exceptional advantages, including economy, when they add an electric to the "stable" for use as a family car, devoted to their town and suburban service.

Our failure to carry this message of education and comparison into the fields where our activities belong is chiefly responsible for the relatively small annual production of electric cars, and the time is at hand when we must deliver this message aggressively to the four corners of the country or reconcile ourselves to decline into a hand to mouth existence and final oblivion.

CO-OPERATIVE ADVERTISING

It is obvious to us who are concentrating our energies toward the education of the public concerning the utility of the electric that success will crown our efforts if central station interests throughout the country will aid us with their financial and constructive co-operation.

The cost to successfully carry out a thorough campaign of education has far exceeded the financial resources of any company or group of companies limited to an output of five thousand cars per annum; particularly when all members of that group were not united in burying destructive jealousies and working in harmony toward the upbuilding of their industry. Until eighteen months ago, there had not existed any concerted and organized effort to pool the constructive and educational work, or to seek the indispensable co-operation of the central stations which have for sixteen years been selling current to users of electric vehicles.

Just a year ago, the manufacturers subscribed to a joint fund of $50,000 over and above their individual advertising appropriations, conditional upon central station interests subscribing an equal amount, the total fund created to be expended by an impartial committee in nation-wide educational publicity.

It was a splendid undertaking and deserving of success. A number of central stations responded handsomely, but three months of concerted effort failed to secure their requisite total and the longest forward stride yet attempted by the industry proved abortive.

The executives of one manufacturing concern then took their courage in their hands, and entered upon a highly organized and intensive sales and creative program in order to satisfy themselves whether or not the electric pleasure car can be made a commercial success.

With an advertising appropriation exceeding what their then volume of business could afford, they gambled upon the future and commenced telling the general public what the electric car can actually accomplish for its owner, convincingly comparing its attributes, its radius of operation, its safety, its economy, and its efficiency with the gasoline car when used in that same 95 per cent field of utility. They sought and obtained the generous and whole-hearted co-operation of many central stations toward telling their story intelligently and sharing a part of the expense of telling. The mutual reward has been reflected in a tripled output by the factory and a relative increase in the amount of off-peak current used by the purchasers of the cars.

Every single other manufacturer can build the same kind of structure if he will go about it in the same organized and constructive manner, convincing the buying public that the electric is a utility car first and last, and a beautifully appointed drawing room on wheels only when it is desired as such.

At the outside, two years of combined effort between the manufacturers who get but one profit from the sale of a car, and the central stations who get an annual profit per car for an average period of seven years, until it totals far more than our initial profit, then we will reach our 15,000 new car volume per annum.

Have the administrative officials of the central stations represented at this convention any conception of their aggregate annual income from the sale of current to owners of electric cars?

There are now in daily use approximately 20,000 electric pleasure cars, averaging conservatively $100 per year each for current, totalling two million dollars' worth of juice, at least 75 per cent of which is used in the large cities where the garages and owners are restricted to the use of off-peak load. Current for charging electrics is the best and most profitable off-peak load to be obtained. When the yearly product reaches the obtainable 15,000 cars, the central stations will add $1,500,000 each succeeding year to their previous sale of current. If this entirely reasonable prophecy is fulfilled, the central stations of the country should within seven years from today receive the handsome total of $10,000,000 per annum from the sale of current to electric cars.

Therefore, if the central stations will spend but 15 per cent of their present income from the sale of juice to electrics, that is to say, $100,000 per year, exploiting the use of electrics, and lend their influence by example, it would require just about two more years to reach the 15,000 mark.

Many central station officials have become discouraged because of the failure of their previous efforts to establish electrics in local popularity and are inclined to judge the modern car by the short-comings of obsolete and decrepid antiques staggering around their streets, without stopping to consider that during the past four years the electric has made greater advances in design, beauty, comfort, and performance, than the gas car has accomplished in a decade.

It has taken the manufacturers in many cases fully five years to develop business in some localities to profitable proportions, where now it is gaining surprising headway. More than thirty towns of less than 25,000 population can be mentioned by name which twelve to eighteen months ago scarcely knew of the existence of the electric, which today have from five to twelve modern cars upon their streets.

Let the operating officials take a leaf from this book of experience and renew their encouragement and co-operation without which our task is indeed difficult.

PHYSICAL CO-OPERATION OF CENTRAL STATIONS

The co-operation of central stations must by no means be limited to their contributions to advertising expense. There are other and more tangible methods of aiding the local dealers in electric cars, and of creating a better feeling amongst the owners.

The really big co-operation of the central station is to make it easy to own and operate an electric, a task which physical reasons prohibit the manufacturer from undertaking alone.

Unfortunately for the sale of electric vehicles, their few shortcomings are the very ones which psychologically produce the maximum adverse thought and criticism on the part of the purchasing public.

The dread of being stranded and helpless while returning from a journey, or finishing the trip on the end of a tow rope; the nameless fear of battery trouble for which the remedy is unknown; the effect upon the mind in consequence of being passed and left behind, or arriving late at destination, are all creative of impressions which for purely psychological reasons become indelibly stamped upon the mind, to be erased only by correcting the conditions which have caused them.

Special reference is made to the scarcity of charging and boosting facilities in the environs of the large cities.

The central stations can lend most valuable physical co-operation by installing charging outfits in carefully selected outlying and suburban garages, or sharing this expense with the dealers and the garage, and by assisting the dealers to instruct the garagemen and his employees, who are ordinarily antagonistic to the electric, and keep them under observation until they become proficient in the care of and attention to the batteries.

The representatives of the battery manufacturers should be deeply interested in this important development, and participate in the educational work.

The big cities and their suburbs should be charted and the dealers work in conjunction with the central stations to establish boosting stations.

Boosting plugs operated by coin meters should be installed at all representative city and country clubs, at recreation fields, baseball parks, important roadside taverns, small town hotels, and at popular shore and country resorts.

The electric will become standardized as a club car when the clubs have charging facilities.

Lighting plants or sub-stations in small towns on the main highways should be equipped with convertors or other apparatus for charging batteries.

When the central stations make it as easy to obtain current as the Standard Oil Company has made it to obtain gasoline, the story of the electric vehicle will have a different telling.

In every city in the country where there are 10 or more electrics in daily use, the central station should employ in its service department an experienced battery man, who has the

intelligence and the ability to instruct garage mechanics as well as owners of private garages in the most efficient and economical methods of charging and discharging batteries and of caring for them. Thoroughly competent battery men are scarce, even in the large cities, therefore there is much educational work of this kind to be done and nearly all electric garage owners and their employees are anxious to improve and are willing to be taught. Incompetence in this department is destructive to the life and efficiency of the batteries, and creates intense disappointment amongst owners respecting the performance and mileage radius of their cars, and breeds dissatisfaction because of the expense of battery repairs and renewals when least expected.

The central station should be informed of each new privately garaged car on its line, should have its service man get in prompt touch with the owner, learn his requirements, advise him as to the best methods of care and charging, recommend and assist to install suitable apparatus, inspect it regularly, and show the most economical way to use current.

Garage owners and car owners alike will welcome central station inspection, assistance and advice.

It is noticeable that in cities where the central stations are now rendering this co-operation, the electric cars on the streets show more snap and speed, and there is a better satisfied group of owners than in cities where it is lacking.

Another tangible means for benefiting the industry is to establish for privately owned garages a rate for current that is lower than the house lighting rate, for example, a maximum of 4 cents per kilowatt; restricting the owner, if need be, to the use of off-peak current.

A special rate to the owner places a powerful selling argument in the hands of the local dealer.

Central station officials are invariably men of affairs and high standing in their communities, and their stamp of approval placed upon the electric by setting the example of personal or family use never fails to influence a strong sentiment in favor of the electric. There is a common remark that if the central station official prefers to pay a high price for gasoline to run his car when he can get electrical juice for nothing, there must be some good reason for it.

It is about as logical as it would be for a brewer to combat his source of income by voting the Prohibition ticket.

The industry would receive a powerful "boost" if the central stations would universally adopt the electric car for general service. Reference is not made to trucking, for they are already generous users of electric trucks, nor do I refer to the outlying country service where speed and distance are of prime importance, but I do mean to say there are thousands of low-priced gasoline cars being used for inspection and emergency service, and by business solicitors, when the electric would serve the same purposes with equal or greater efficiency and at lower cost for operation and maintenance.

The central station officials will reply to this by saying that the electric car makers do not build a car suitable for their purpose, nor at a price within reason, and they proceed to fling in our faces the prophecy made by Dr. Steinmetz three years ago that the day of the $500 electric is at hand, and when it arrives they will adopt it for general use. Just how we are to equip even a cheaply built chassis with open body, with a motor of sufficient power and a battery providing sufficient mileage for their requirements, and still make a living profit on a $500 price, deponent saith not.

The manufacturers understand that the expensive brougham or coupe is entirely unsuitable for this general service of the power companies, and some of them stand ready to build and deliver a standard type of service car at a specified reasonable profit based on the cost of production, *provided* the central stations will themselves design a standard car acceptable to them all, and combine in placing an initial order for a sufficient number to warrant the preparatory engineering, experimental and installation expenses. Upon the adoption of this plan it is not impossible to produce a thoroughly satisfactory service car around a thousand dollar price.

The opposition to the use of an electric service car does not arise primarily with the central station officials, but with the employes who must operate them. This is traceable to the general practice of permitting each employe to use his car after business hours for his family purposes conditional upon his paying out of his own pocket all expense of operation and upkeep exceeding a stipulated amount per week. Naturally, the employe desires a car that he can joy-ride for long distances on Sundays and holidays.

Therefore, until the officials of each central station take a firm stand against the joy-riding of their service cars, and limit their use solely to business purposes, just so long will the influence of the employe be used against the adoption of the electric as a standard.

THE RELATIONS BETWEEN POWER STATION OFFICIALS AND ELECTRIC CAR DEALERS

It has been said herein, and it is true, that many of the central stations have responded generously to the requests for co-operation made by the manufacturers, but unfortunately cordial and co-operative relations seldom exist between the officials of these stations and the local dealers representing the manufacturers. This is almost entirely due to the absence of contact between the two. The official, being surrounded with glass partitions and red tape, is difficult of access, and when the dealer finally gets past the intervening office employees he feels nervous and unwelcome, and the two promptly irritate each other, and nothing results to the good of either. The dealer seldom prepares himself with a definite proposal for co-operation, and the official is uninterested in abstract statements, and in the details of petty grievances, which he prefers should be handled by their proper departments. The dealer thinks the official cold-blooded and selfish, and the official thinks the dealer narrow and unbusinesslike. They simply rub each other the wrong way.

The sectional meetings of the Electric Vehicle Association of America do not materially improve the local conditions, because they are poorly attended by the dealers when they find the contact there, is not with the principals or those in authority.

If the central station would delegate a department manager to receive the dealers cordially at his office, to occasionally visit the dealers and listen patiently to the relations of their troubles and study their desires, to attend the sectional meetings, and assist in formulating schemes of mutual benefit, then and not until then will local constructive work be conducted between the makers of and users of current for electric pleasure cars.

That this general condition is understood by some of the progressive minds in the National Electric Light Association ranks is borne out by the following quotations from a paper presented on March 24, 1915, before the New York section of the Electric Vehicle Association by a then prominent central station official, Mr. Stephen G. Thompson, of the Public Service Electric Company of Newark, N. J., under the caption "Central Station Attitude Toward the Electric Vehicle." Mr. Thompson says in part:

"Among those things which might be termed pathetically ridiculous is the attitude of the average central station executive toward the electric vehicle. * * * notwithstanding that this particular type of machine bears the hearty indorsement of the technical and commercial leaders of the entire central station field itself and with but one or two notable exceptions has a greater earning per horsepower of connected load than does any other type of electrical apparatus. * * * First considering the passenger machine, the income derived from each vehicle approximates that from the average residence. One hundred dollars per year per machine is a fair estimate of the amount of money derived from this class of business, while the load is particularly valuable as being of an off-peak character and requiring no additional investment for power house equipment and line extensions. * * * It is apparent that this vehicle load presents a valuable source of revenue to the central station and that its development is not made a part of the daily work of the power solicitor is probably due to the fact that a comprehension of its value has not been brought home to the management, or that it has not been fully appreciated.

"For some unaccountable reason, the electric vehicle is supposed to be inherently incomprehensible except to the expert in that particular line. Although this is not so, this belief provides an excuse for the power solicitor to side-step any proposal that he interest himself in the sale of electric vehicles. * * * Let the management heartily endorse the electric machine and endeavor to promote its use, and little difficulty will be experienced in getting the rank and file to fall into line."

SOME OF THE LOCAL PROBLEMS.

Probably the most serious handicap to the sale of electrics is found in the traffic regulations and the lack of parking facilities in the larger cities. This is particularly true in many of the eastern cities where the regulations forbid that cars be left unattended, and that even when attended they must be moved every half-hour—in some cases every fifteen minutes.

With a chauffeur-driven car this is not a serious inconvenience, but for the professional man, or woman who is shopping or attending a matinee, it is a hardship and modifies one of the most powerful arguments in favor of the electric. It is for this reason that the family chauffeur is frequently seen driving the electric in the congested districts.

If the financial and administrative powers within and behind the central stations will lend their aid and influence to the efforts of the manufacturers and dealers to induce local traffic and parking regulations that are sane and reasonable, a tremendous impetus will be given the electric car industry.

Chicago has handled this problem in a satisfactory manner which can well be followed by other large cities. A parking place has been provided on the lake front, but a few blocks distant from the shopping and theater districts. At two places, one of them being the local offices of the lighting company, attendants and telephone service are provided at the joint expense of dealers, garages, and central stations. The attendants convey the cars to and from the parking place, thereby relieving the owner of the car of all inconvenience and delay.

In nearly every city there is a park, an open square, or a vacant lot convenient to the retail stores and office buildings

where suitable parking arrangements can be made and permanent attendants provided at reasonable expense commensurate with the increased sales sure to follow.

RESALE OF USED CARS

A problem forever confronting the local dealer is to resell without loss the used car taken in trade. Fully sixty per cent of all new car sales involve the trade-in of an old car, frequently appraised by its owner at a figure greatly in excess of its actual resale value.

It must be borne in mind that the inducement to sacrifice the family electric on the altar of exchange does not exist to any such extent as with the gas car.

The universal adoption of the Central Market for Used Car Report, published at Chicago, as a standard of used car values, both gas and electric, makes it possible for the dealer to show his customer instantly the market value of his old car, in precisely the same manner he would refer him to stock exchange reports on bonds, stocks, grain, cotton, or other commodities of constantly changing values.

Thus the electric car dealer has been enabled to place his business upon a firm foundation, acquiring the old car at an allowance price which will permit its resale without loss.

THE DEVELOPMENT OF NEW FIELDS

The small town business is now becoming exceedingly productive through alliance with electrical supply dealers, storage battery dealers, and kindred interests. The volume of starting and sparking battery recharging makes a fair business for one well equipped concern in each community, which is freely patronized by all dealers so long as it does not take a gas car agency, but no opposition is offered to an electric car agency, which aids in building up the charging station facilities.

The encouragement and sometimes the financial aid of the local central station has been necessary to the success of many of these enterprises, which not infrequently are started by ambitious but impecunious graduates from the central station itself.

BUILDING UP LOCAL POPULARITY

The spotlight of local publicity is not sufficiently thrown upon the wonderful utility of the modern electric. Too little thought and attention is given by either dealers or central station officials to promote their mutual interest by showing the populace what the electric can and does perform locally. Sociability runs to neighboring points of interest should be promoted; reliability, efficiency and mileage stunts should be performed; mountain or hill climbing feats publicly featured; economy tests announced in figures that are understood; pictures of notable owners in their cars, who do not object to publicity, should appear in the Sunday papers; and prospective buyers should be told the names of prominent local owners.

In practically all of these important measures, the central station can render invaluable assistance.

THE PSYCHOLOGICAL EFFECTS OF PAST HISTORY

There are numerous localities in which electrics, once popular and in general use, are today forsaken by their former friends.

This is invariably traceable to reprehensible selling methods of local dealers, unfulfilled promises, indifferent service, extortionate repair charges, and dishonest substitutions.

The indifference and incivility of garage employes have a lasting effect, especially the antagonism of those where electrics were stored in gas car garages.

Frequently the electric garages were not modern, nor conducted on a business basis, resulting in cars being injured, upholstery soiled, batteries burnt out, inadequate battery charging and disputed invoices.

Formers owners have been slow to forget these grievances which they have invariably charged up against the manufacturers who refused to accept responsibility for the sins of omission and commission of unreliable dealers.

Much is now being done to remove old animosities through the concerted efforts of the manufacturers, the dealers, the storage battery people, and the central station officials, these being the four interests which are concerned in the success of the industry.

Business methods, as well as cars, have been modernized. The successful dealer of today can achieve that success only through playing the game according to the rules of truth, honesty and service. He must not only sell his customer, he must keep him sold; in other words, make him a booster.

---

When approaching a fractious horse, stop your car, get out and offer to assist in leading the horse by.

---

Never, under any circumstances, drive fast approaching or passing a school.

## Splendid New Service Station for Detroit

A most marked evidence of the rapidly growing popularity and the prosperity of the Anderson Electric Car Company is soon to appear in the form of a splendid new service, repair, and sales station to be erected at the corner of Cass avenue and Antoinette street, Detroit.

The new building will be four stories in height and will have a floor space of approximately 60,000 square feet. Every convenience will be installed in the service and repair departments for efficiently and quickly handling all kinds of electric car and battery repair or adjustment work. A special feature of the service department will be the enlargement and perfection of a monthly inspection and adjustment service, for which a very nominal sum will be charged the car owner. This service will be so comprehensive and thorough that it will keep the average car in perfect running condition, thereby eliminating expensive repairs that are often the eventful result of improper care or neglect. All makes of electric cars will be welcome at the new station.

A special department for automobile painting will




*Anderson Electric Car Company's New Detroit Service Station.*

be installed which will be representative of the highest standards of the coach painting art.

From available statistics, it appears that the new Detroit Electric car station will be the largest and finest establishment of its kind in the United States and may be properly termed a fitting monument to the progress, energy and foresight of the Anderson Electric Car Company, who have constantly striven to place the electric car in its present position of approval.

At the present time there are over 800 Detroit Electric cars in and about Detroit. More than a year ago it became apparent that the present service station of the Anderson Electric Car Company at 687 Woodward avenue would very soon become inadequate to care for Detroit Electric Cars, considering the volume already in use and the rapid rate of increase as evidenced by the daily sales. The larger and more efficient facilities of the new station, therefore, appear to be merely the logical necessity created by a prosperous, well-managed industry.

After a very careful analysis of the main arteries of travel, width of various streets, accessibility from all parts of the city, the location at Cass and Antoinette was selected. It is prophesied by those who are best informed that within the very near future, this district will be the heart of the retail automobile business in Detroit.

## The Ohio Demonstrates Its Hill Climbing Ability

R. B. McIntosh, of the Washington Street Electric Garage Co., of Los Angeles, California, the Ohio Electric distributor in southern California, has just made a report and sent photographs showing an Ohio Electric on Mt. Hollywood, near Los Angeles.

The drive was made with a prospective customer who wanted to be shown that an electric car really could be used satisfactorily and safely on roads not paved and it is needless to say that the demonstration was very convincing.

A great many people, even including some electric car owners, have been a least bit skeptical of the hill-climbing ability of electric automobiles, owing to the false impression created partly by salesmen of gasoline cars that an electric, although suitable for city driving on nicely paved streets, could not be used advantageously in hilly districts or over country roads.

The Ohio Electric Car Company, through its various agencies, has made a number of very interesting demonstrations to counteract the effect of this false impression.

The most remarkable performance was a drive to the top of Stone Mountain near Atlanta, Georgia, not only once but a second time as well—to convince those who doubted the first performance.

The next was a drive across the rough and mountainous country between Atlanta, Georgia, and Chattanooga, Tennessee, where the car was driven to the top of Lookout mountain and also to the top of Signal mountain without any difficulty and with absolutely no trouble of any kind.

The last performance just reported by Mr. McIntosh offers still further proof of the stability of Ohio electric construction and the adaptability of this car for use in very hilly sections of the country and even over bad country roads.

When electric car owners and those interested in the purchase of electric cars learn just how fully these cars will fill their requirements not only for city use but for suburban driving as well, the popularity of the electric will increase and the demand for electric automobiles will increase accordingly.

Mr. McIntosh proposes to make many more demonstrations of the ruggedness of Ohio construction by driving an Ohio car over all of the mountains in the vicinity of Los Angeles over which automobiles of any kind can be used and he expects to have motion pictures made showing some of the most remarkable performances of his Ohio electric.

## Two Profitable Cross Country Runs

H. H. Dennis of the Electric Sales and Service Co. of Toledo, will henceforth eschew the pesky railroads in delivering his electrics. His experience in delivering two of them, cross-country, to Tiffin, Ohio, has been very successful; both from the standpoint of the local newspaper publicity received and the firmly implanted conviction in the customer's mind of its reliability and the ease with which the trip was accomplished.

When Lynn Troxel of Tiffin was informed of the intention of Mr. Dennis to save the finish of the car and the freight bill by driving it to its destination, he was so thoroughly convinced that Mr. Troxel would never make it that he came to Toledo just to be in at the finish of the car to witness Mr. Dennis' discomfiture.

Mr. Troxel states: "We left Toledo at 3:00 P. M. with the odometer reading 25.6 and reached Tiffin at 6:30, odometer 81.1 and even then the batteries were far from discharged for we drove around the town quite a bit that night.

"To me the astonishing part was the way the car ran on country roads and up hills with more comfort than any touring car and at a very reasonable speed. From now on any claims made for an electric will not be doubted by any of our family."

This trip so impressed Mr. and Mrs. Alexander McCartan who had also ordered a Detroit, that they determined to see for themselves and consequently came



*The McCartan Party Leaving Hotel Secor, Toledo.*

to Toledo with their daughter Eileen to take the trip. The illustration shows the company in front of the Hotel Secon, Toledo, before leaving on the trip in the Model 59.

There was about 700 lbs. weight in the car, roads were very rough and there was a very strong head wind nearly all the way, which caused the car to draw ten amperes extra. They had 77 volts on 4th when they reached Tiffin and they drove the car all around Tiffin the next day on the same charge.

Mr. and Mrs. McCarten are more than pleased with the Detroit and are going out of their way to ask their friends to buy the Detroit. These two trips to Tiffin have caused a lot of comment among electric car owners and prospective purchasers and the people in Tiffin now are sure they can drive a Detroit to Toledo on a single charge.

## 72 Miles Over Country Roads

Thursday, May 11, 1916, A. W. Tourtlelotte, of the Law Auto Co., La Crosse, Wis., and C. W. Long, of the Anderson Electric Car Co., started from the Law Auto Co. garage at 7:10 a. m. in a Detroit Electric for Sparta, Wisconsin, arriving there at the Sidney Hotel, at 9:25 a. m. They then demonstrated the car around Sparta 3½ miles before dinner. After dinner a trip of the worst hills in the state of Wisconsin, through with five people in the car to show what hill climbing and rough road work the car would do. They left Sparta and reached La Crosse with the car still running strong—total distance covered 72 miles, over some of the worst hills in the State of Wisconsin, through some deep sandy roads and at one portion of the trip through a road that had been plowed up for one quarter of a mile.

The car used was a new model 60 demonstrator that had only been run 38 miles.

Editors: ED. J. MOCK, PAUL H. WOODRUFF
Associate Editor, CARLYLE FLIEDNER
Circulation Manager: N. S. STRONGE
CHARLES R. CONDON: New York Representative
New York Office, 1022 Longacre Building
Forty-second St. and Broadway
Telephone Bryant 7030

*This publication is free and independent of all business or house connections or control. No manufacturer or supply dealer, or their stockholders or representatives, have any financial interest in Electric Vehicles or any voice in its management or policy.*

Entered at Chicago Post Office as Second Class Mail Matter

# ELECTRIC VEHICLES

PUBLISHED MONTHLY BY
ELECTRICITY MAGAZINE CORPORATION
Monadnock Building, Chicago
TELEPHONE: HARRISON 3014.

New York Office, 1022 Longacre Building, 42nd Street and Broadway.

Ed. J. Mock and Paul H. Woodruff, Editors

NOTICE TO ADVERTISERS
Changes of advertising copy should reach the office of publication not less than ten days in advance of date of issue. Regular date of issue, twenty-fifth of each month. New advertisements will be accepted up to within five days of date of issue, but proof of such advertisements cannot be shown in advance of publication.

SUBSCRIPTION PRICE
Per Year $1.50

| | |
|---|---|
| Canada | $1.75 |
| Foreign | 2.00 |
| Single Copy | .15 |

FOR SALE AT ALL NEWS STANDS

NOTICE TO SUBSCRIBERS
REMITTANCES — Remittances should be made by check, New York draft or money order, in favor of ELECTRIC VEHICLES. Foreign subscriptions may be remitted direct by International Postal Money Order.
CHANGE OF ADDRESS—The old address should be given as well as the new, and notice should be received two weeks in advance of the desired change.

If Your News Dealer Will Not Supply You—Please Notify Us

Volume VIII CHICAGO, JUNE 1916 Number 6

## Is the Industry Big Enough for Its Opportunity?

"AFTER Gasoline—What?" That is the title of Waldemar Kaempffert's article in McClure's for June. It is a comprehensive article, and rather an alarming one for the owner as well as the builder of gasoline cars. A quantity of liquid fuel which, he says, was produced in nature's laboratory only after the lapse of a million years or more is consumed by gasoline engines in a few flitting seconds. If all of them in the country were to run ten hours a day, the gasoline supply would last about a month. Less than six hundred gallons are available for each car. The overproduction of previous years, judiciously stored, is all but exhausted. The market demand for gasoline can hardly be supplied for another twenty years—and the demand is increasing. We are literally facing an automobile fuel famine.

The shortage of gasoline, Mr. Kaempffert declares, may signalize possibilities for the automobile that eclipse anything we have witnessed; the motor car industry is facing not a crisis, but an opportunity!

Whose opportunity is it?

Does the future of the power-driven vehicle depend upon the hypothetical inventions of dabblers in kerosene, alcohol, and a host of other complex chemicals whose only promise is that they are inflammable liquids, or does it depend upon the grit and daring and ability of the men behind the greatest motive power in the world?

Will the builders of electrics, with their efficiency demonstrated and proven, with their problems solved for all time, allow the promoters and experimenters with their new and untried fuels and their new and untried engines to capture the greatest opportunity motor car history ever knew?

The whole world has adopted the power vehicle as its daily habit.

Its very popularity has exhausted its means of propulsion. Yet right at hand—already established—already preferred by the more intelligent—is a better, a simpler, a cheaper, a more efficient, a more satisfactory, an inexhaustible motive power.

Is the electric vehicle industry big enough to seize and hold this wonderful thing that fate has thrust into its very grasp?

## The Kind of a Car a Man Wants

THE kind of car a woman wants is an electric as it is built today. There is no question about that. She is entirely satisfied with the design and the upholstering and the mileage. No doubt every woman alive would own an electric if she could afford any car for herself. It is a woman's ideal car because it has been built through the years with just that end in view. The electric has been designed for and advertised to women in nearly all cases.

The thing that is effeminate, or that has that reputation, does not find favor with the American man. Whether or not he is "red-blooded" and "virile" in the ordinary physical sense, at least his ideals are. The fact that anything, from a car to a color, is the delight of the ladies is enough to change his interest to mere amused tolerance.

All this, of course, is logically absurd as it applies to the electric. It is just as much a man's car as it is a woman's. But the purchaser of a car cannot be expected to use logic in arguing himself into buying. Having imagined effeminacy into the electric, he dismisses it from his mind and buys a gas car without a struggle.

The questions of speed and mileage we can dismiss from the argument. We know they will be improved with the inventions of time; but they have been proved already sufficient for the work of the man's car. The man is satisfied with twenty miles an hour, or twenty-five for a maximum emergency sprint. He is satisfied with a reasonable day's work, which means not over seventy-five or eighty miles, and generally much less. The things in an electric he is not satisfied with (meaning, of course, the man who buys gas cars) are much simpler problems, much more easily changed.

The lines typical of the closed body electric do not appeal to the American man. The lines of the gas car do appeal to him. Why? Is it because the gas car designers have perverted his eye so that he cannot recognize a good thing when he sees it in the shape of an electric? Some of the electric car designers appear to believe that theory; but we cannot subscribe to it.

We are sure that the gas car carries out the lines it does because the men who buy want those lines—and not just because it is a gas car.

And the same thing applies to the tiller steer—another thing objectionable to mere man. Man wants a steering wheel, wrong as the notion may be, in his hands when he drives. He wants the wheel not because the gas car gives it to him—the gas car maker gives it to him because he wants it. The tiller is better; but he doesn't know that.

All the way through the gas car people have catered to the tastes of the male. Don't make the mistake of thinking the reverse—that the male's taste has catered to the gas car designer. The buyer's taste leads always, and dominates the situation. The maker who fails to meet it, who tries to change it, sells no cars.

We are aware that electric cars have been made with masculine lines and masculine equipment, and have failed. That is no argument. So have gas cars failed—some of them very pretty jobs, too. We know also that at least one maker is building—and successfully selling—an electric car designed for men, which promises to develop considerable masculine favor.

That is something the wheeled boudoir cannot accomplish.

Advertising and a live sales force can sell a lot of things; but they never yet sold anything to a man who did not like it—not in profitable quantities, at any rate. The way to succeed largely, it is plain, is to sell what the people have demonstrated they want, and not something that they must be educated up to.

The engineer smiles a bitter smile when he sees the purchaser pick out a car because of its lines.

But the wise automobile man knows that, other things being approximately equal, the lines sell the car every time. There is no sense in scoffing at this truth. The purchaser is entirely right. Nobody sneers when he insists that the lines of his house be pleasing according to his conception of beauty.

The lines of the typical electric are pleasing to the women, as we said when we started out. They are not pleasing to the average man. If the electric is to be sold only to women, no further development is necessary in that way. If the field is to be broadened to include the men, and to compete with the gas car for their favor, some changes must be made.

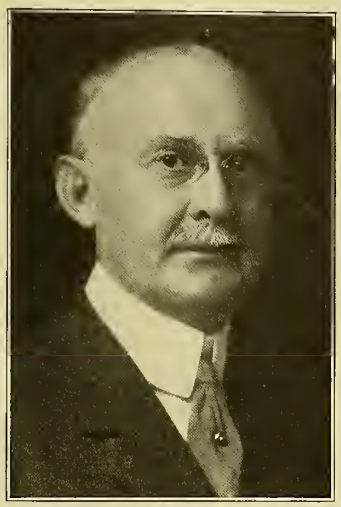
It is often said that woman actuates the purchase of nearly everything. She does. But mark well the exception: Never does the woman decide the purchase of the man's car, and she never will. The designer who would build an electric to please men must forget all he ever knew about making a woman's own car.

# Scientific Transportation Methods

*The System Put Into Use After Much Study By the Philadelphia Electric Company*

BY A. JACKSON MARSHALL

THERE are several reasons why a review of the methods employed by the transportation department of the Philadelphia Electric Company are apropos at this time—the vice-president of that company, Mr. Walter H. Johnson, being the chairman of the Electric Vehicle Section of the National Electric Light Association, and formerly president of the Electric Vehicle Association of America. In addition, the superintendent of the transportation department of the same company, Mr. W. A. Manwaring, is serving on the standardization, operating records, insurance, and garage and rates committees of the Electric Vehicle Section, N. E. L. A., and is a member of the executive committee, and chairman of the garage committee of the Philadelphia Section, Electric Vehicle Association.



*W. H. Johnson*

Another very vital reason is that the intensely practical methods employed by the Philadelphia Electric Company can be studied with profit and applied by a great many other central stations.

Too often the transportation of merchandise is considered a horse-drawn or automobile proposition, whereas, it is a transportation problem that should be solved by utilizing those agencies which a practical knowledge of transportation gives or assures. There is a tendency many times to purchase equipment, which instead of meeting exact requirements will suit the taste of a particular individual who may or may not have a knowledge of transportation engineering. As a result of unstudied purchases and a wide difference of opinion as to the type of equipment, a number of central stations whose business and territories are comparable, will have radically different types and forms of equipment employed. It is well nigh impossible to prescribe a classification of central station transportation equipment, which without variance will meet the demands in all cases, for it is realized that the extent of territories, topography, lay of the ground or grades, services, etc., differ considerably. However, there are fundamental characteristics present in most services, which could be admirably served by a general standard sufficiently flexible to meet any peculiar local situation.

The same general rules that apply to all transportation should apply to that department of a central station industry, and an electric vehicle should not be employed if it cannot perform satisfactorily the work which it is assigned. On the other hand, electric vehicles should invariably be used where a careful analysis of the work to be done shows that the electric is suitable, and in all other cases the electric vehicle should have the benefit of the doubt and should be given the preference over gasoline equipment, if there is no considerable difference in the service. Members of the organization should not be permitted to influence the purchase of gasoline equipment unless it can be conclusively and definitely demonstrated that an electric vehicle could not give the required service. In other words, instead of putting the burden of proof on the electric, assume that the electric for the greater part of the city and suburban work is the car par excellence, and compel the gasoline car advocates to prove their contentions.

There are two excellent reasons why it is imperative for the central station to use the electric in every possible capacity; first because it will transport merchandise economically and satisfactorily, and second, because the operation of electric vehicles by central stations will influence their introduction in other lines of industry. It is a difficult thing to convince merchants of the practicability of the electric vehicle in cities and towns where the central stations are using gasoline cars, when it is evident to any one familiar with transportation engineering that the electric is the equipment best adapted to the service.

The Philadelphia Electric Company has approached its transportation problem in what appears to be an intensely practical manner. It has first, and perhaps most important, placed its entire transportation in the hands of a single department, headed by a competent transportation engineer.

When any branch of the Philadelphia Electric Company's service requires transportation of any character, its responsibility ends immediately after the transmission of the order to the transportation department, after which the actual task of performance, including equipment and labor necessary for the proper execution of the work, is left entirely to the transportation department.

When any additional equipment is required, instead of leaving to some individual unacquainted with transportation science the purchase or choice of fancied equipment, requisition is made to the transportation department, after which a thorough engineering study is made. The equipment which is found, after scientific investigation, will best serve the needs of the company, is purchased, with the result that economy in innumerable directions is effected and the standard of transportation is maintained, which in turn materially helps to sustain the general service rendered by the company.

A few of the methods employed by the Philadelphia Electric Company in its transportation department, based on a statement made by Mr. W. A. Manwaring in a recent issue of the company's house organ, would seem to be appropriate at this time. Follows an abstract of the article:

"The birth of the transportation department dates practically from 1899, occurring shortly after the consolidation of the various electric lighting companies which were absorbed at that time by the present Philadelphia Electric Company. Prior to that year most of the individual companies—in fact, in most cases each plant, office or storehouse was equipped to do its own hauling, or was having it done by outside contractors or teamsters.

"In 1899 the total equipment of the consolidated companies consisted of thirty wagons and thirty-three horses, with no power vehicles of any character, each station maintaining its own equipment and superintending the hauling.

"The first power vehicle owned by the Company was purchased in 1903 from the Pennsylvania Electric Vehicle Company. This machine was a 'Mark Three' electric runabout, equipped with a 40-cell 11-plate P. V. exide battery. It was garaged in a small stable in the rear of a sub-station where a motor generator set of small capacity was installed for charging its batteries. Shortly after this time, a second electric runabout was purchased from the same company, the batteries of this machine being charged from an exciter. A third machine, of the same type, was purchased for the use of the executive officers and was also garaged at a substation. The purchase of these three machines was actually the beginning of the power vehicle equipment of the company. Additions were made from time to time, and the horse-drawn wagons and carriages were gradually supplanted.

"In the fall of 1904 the first real move was toward modernizing the transportation department, for in addition to the horse-drawn vehicle equipment, which remained about the same, there were placed in service five electric runabouts for patrolmen, four electric lamp wagons, two electric construction trucks, seven electric service wagons, and one electric cable truck equipped with a winch for pulling cable and with a centrifugal motor-driven pump for pumping out manholes. The electric trucks were used for changing arc lamps and hauling aerial line gangs. The addition of the trucks reduced the number of horses used from thirty-three to twenty-two. Even the addition of this equipment, however, was not sufficient to handle all of the company's work, the underground department and the installation bureau still employing outside teams.

"At this time the electric vehicle industry was still practically in its infancy and few experienced men were available for the care and maintenance of electric trucks. It was necessary, therefore, to educate one of our men for this work. He was sent first to the Hartford Rubber Company to obtain experience regarding tires. After leaving the Hartford Rubber Company, he went to the Pennsylvania Electric Vehicle Company's garage on North Broad street, where he received a thorough course of instruction in the care of electric vehicle batteries and machines. After completing his training, he returned and assumed charge of our new garage, an old station which we used for this purpose. It had been idle for a considerable length of time and was naturally in a very deplorable condition. The main floor, which was formerly used as the engine room, and which was selected for our garage, was covered with engine foundations and fly wheel pits. These had to be cleared away and a new cement floor laid. The new five-story building, containing storehouse, lamp-room and machine shop, in the rear of the present plant, was also added at this time.

"In order to provide the proper charging facilities for the number of electrics we were then using, we installed a motor-generator set, consisting of a 2-phase, 200 h.p. induction motor, driving a 160-ampere, 120-volt generator, and the necessary switchboards, which consisted of one machine control panel, two distributing panels and twelve charging panels, the latter being equipped with twenty-four charging outlets. An underdrained battery wash was built for washing battery plates, and a 30,000-pound hydraulic lift was installed for raising and lowering the batteries to their places in the vehicles.

"During the summer of 1905, the machine shops and lamp repair rooms and all the store-rooms, excepting two, and aerial line gangs' headquarters in various parts of the city were combined and moved to the five-story warehouse erected in rear of garage, making this station the main storage, repair and distribution point for this division of the company's work.

"From this time on the transportation department had its greatest growth and our facilities were taxed to their limits.

"Each year more power vehicles were purchased, ranging in carrying capacities from five hundred pounds to six tons.

"On January 1, 1911, at the earnest solicitation of A. H. Manwaring, the present transportation department was authorized by President Jos. B. McCall, and organized under the supervision of W. A. Manwaring. It was given the control and supervision of all the company's transportation, as well as the hiring of all vehicular service from outside contractors or teamsters. The first accurate records of all of the company's transportation really dates from this time. It required some little time to effect the complete organization, due to the fact that the vehicles had to be taken over, a few at a time, from the various departments employing them, and each of these departments properly educated in the new method of obtaining transportation facilities.

"As time moved on and our organization grew it was seen by all concerned that motor-driven vehicles were far superior to hired horse-drawn vehicles and accordingly power-vehicle equipment was purchased and used for the work of the different departments of the company.

"With this added equipment, it was soon found that the original garage was becoming entirely too small and additional quarters had to be secured. We then rented a garage, which, like the former one, also eventually became congested, and we moved twice.

"At the same time our horse-drawn equipment had grown correspondingly larger, due mainly to the addition of teams for aerial line construction work, and in 1909 we were compelled to move our stable for this class of vehicles.

"The company, about this time, purchased a plot of ground where a new stable and wagon shed was built in 1912, with accommodations for fifty-three horses.

"While this stable was built primarily for the use of horses and horse-drawn equipment, it was found that the electric tower wagons, which had been added to our service for use in trimming arc lamps on ornamental twin poles in the central part of the city, would not enter the garage doorway, due to the height of the tower, and new quarters had to be secured for them. The only available building was the present new stable, where they have been garaged ever since, and the

necessary charging equipment installed for the care of their batteries.

"The charging capacity of our main electric garage gradually increased from its initial capacity of 160-amperes and twenty-four charging outlets in 1905, to two charging sets of 1,250-amperes capacity, and forty-six 50-ampere, one 100-ampere, and one 200-ampere charging outlets. Forty-eight vehicles can be charged at one time, records of the amount of charge received by each machine being recorded by a special metering system designed by the superintendent. This charging capacity does not include the 600 amperes available at the stable.

"Because of the wide area covered and the long mileage sometimes required by not only our trucks, but the electric trucks of firms in other classes of business, it is found advantageous not only to ourselves, but as a commercial proposition, to provide charging stations in different localities where "boosts" can be obtained.

"With this point in view, mercury arc rectifiers or motor-generator sets have been installed at fourteen stations.

"The electric vehicle of today is a modern machine in all particulars, and its batteries have reached a stage of efficiency where forty or fifty miles can be obtained from them without fear of its having to be towed home at the end of a rope. A 2-ton electric truck purchased on October 24th, 1913, which has been in service 662 working days out of a possible 681 days, averaged 35.7 miles per day, and has run a total mileage of 23,643 miles nup to January 1, 1916, on the original battery furnished with the vehicle, and this battery is, at the present time, giving its full rated discharge. This is the performance which can be obtained from the electric vehicle of today. The original fleet of electric trucks purchased in 1904 is still in service and doing good work.

"At the time of the organization of the transportation department, it was decided that it should be open for business twenty-four hours daily, which has always been done. Vehicular service of any character can be obtained by any employe of the company, calling for the correct number, and asking for the transportation department. This will avoid any possible annoyance and errors, which may occur when the main telephone exchange at Tenth and Chestnut streets, or a district branch exchange is asked to transmit messages to the transportation department.

"While such requests, either for commercial or passenger transportation, may be made by 'phone, as stated above, they must be confirmed in an entirely different manner. The confirmation of a request for commercial transportation must be made on a 'transportation department order card.' This order can be approved by any accredited foreman, clerk or employe of the company, but must be forwarded to the transportation department immediately after the 'phone order has been made. In filling the order, the construction order number, working order number, shop number or account number, to which the transportation is to be charged, must be properly entered, together with all particulars regarding the material to be hauled, approximate weights, time required, etc.

"The confirmation of a request for passenger vehicle service, however, must be made on 'transportation department order for passenger vehicles,' which must be filled out in all details the same as the commercial confirmation card, but must be approved by one of the executives or department heads.

"The above rule is imperative and no passenger service will be furnished unless this routine is properly followed. It, however, applies only to unassigned passenger vehicles.

"The vehicular service of the department is divided into two classes, assigned and unassigned. A vehicle is understood to be 'assigned' when its exclusive use is required and granted to one party or department, and 'unassigned' when not required continuously or used exclusively by any one department or party.

"All passenger vehicles, with very few exceptions, are assigned; the few which are not are used to take the place of any assigned cars which may be out of service on account of repairs, and when not engaged in this manner can be used for general passenger service.

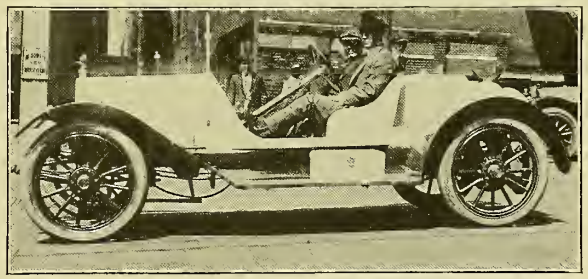
"As the work for the majority of our vehicles is outlined the night previous, it is essential that when possible all requests be received by the transportation department before 5 p. m.

"The present equipment of the company consists of one hundred and twenty-nine power vehicles, twenty-four motorcycles, and seventy-one horses."

## A Distinctive Home Made Electric

The "Thunderbolt," a 20-horsepower electric roadster, a strictly "Made-in-Memphis" product, and said to be the only electric automobile of its kind in the world, has just been turned out from the plant of the Memphis Consolidated Gas & Electric Co. It is the handiwork of C. K. Chapin, and G. S. Turner, plant foreman. It required about six weeks in building.

The roadster has a speed of about 30 miles an hour, weighs about 2,000 pounds and has gas car control. The electric batteries, front and aft, weigh 800 pounds.



*Chapin and Turner's Home Made Electric.*

They will carry the car 75 miles on one charge. The body of the roadster is white, while the trimmings are of light green.

Mr. Chapin will use the "Thunderbolt" for private purposes. It is noiseless, has all the ease in starting or reversing that a gasoline car has and makes an ideal vehicle for city use.

One of its chief advantages is its ready handling due to the wheel steering gear enabling the car to swing to either the right or the left without the hand hitting any obstruction.

One of the chief things in mind while building was to encourage the local electric vehicle sales by showing the simplicity of the mechanism and the ease of construction of this type of motor car.

For this purpose it is extremely useful, as it is generally known to be home made and therefore simple.

# British Electric Vehicle Progress

## *New Ideas in Motor Cars from Over Seas*

*By Our London Correspondent.*

A MEETING of the Electric Vehicle Committee was held in London on the 14th April, 1916, Mr. R. A. Chattock presiding. The special matters dealt with were as follows:

It was announced that all the Associations, with the exception of the Tramway & Light Railways Association, whose reply had not been received, had renominated their representatives on the Committee. The Committee re-elected the representatives of the following:

Provincial Electric Supply Companies.
Makers of Electric Vehicles.
Edison Accumulators Ltd.
Chelsea Electricity Supply Co., Ltd.

It was decided to invite the Motor Manufacturers' and Traders' Society to nominate a representative to sit upon the Committee.

The present officers of the Committee were re-elected for the present year, except in the case of Mr. A. H. Seabrook, who, by reason of the work he is engaged upon in connection with munitions supply in London, is unable to devote any time to the work connected with the honorary editorship of the *Journal*. This work the Hon. Secretary F. Ayton is undertaking pro tem until some one can be found who will accept the position.

It was decided that, in future, dimensions for standards will be given in both metric and British measures and that, in regard to the British measures, exact dimensions will be quoted in mills, while ordinary dimensions will be quoted in fractions. The secretary was instructed to bring this rule to bear in quoting dimensions of standards in the annual report of the Committee.

Mr. E. W. Curtis, of the General Vehicle Co., was nominated as the Committee's representative upon the Tyre & Road Wear Research Committee of the Society of Motor Manufacturers & Traders.

The next meeting of the Committee was fixed for Friday the 16th June at 2:45 p. m.

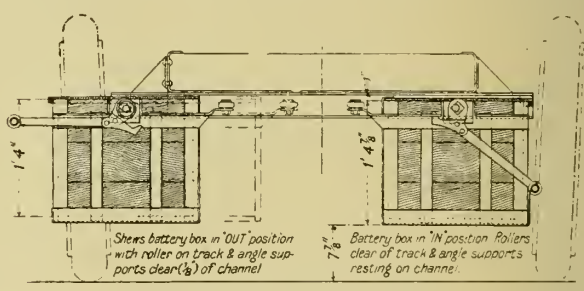
### ORWELL BATTERY CHARGING DEVICE

The Orwell dust-tipping van which I mentioned in my last letter has a very interesting battery charging device which we are now able to illustrate. The battery is divided into two halves and each half is accessible from the side the battery compartment is on rollers and moves back and forth like a drawer. On each end of the battery drawer, transverse to the frame, is located a lever. These two levers are connected at their outer ends by a rod running parallel to the frame. When it is desirable to inspect the batteries this rod is lifted up which throws the rollers on the end of the two bell crank shaped levers into operation.

It is then an easy matter to roll the battery out for inspection, as the horizontal bar is lifted far enough upward to clear the compartment. When the bar is down and the battery in place the rollers are lifted out of engagement and the compartment drawer is clamped into place. The illustration shown gives an idea of the proportions and dimensions of this extremely meritorious device.

### THE ELECTRIC IN OPERATING SERVICE

The battery-propelled vehicle still is in the minority compared to the horse-drawn and petrol and steam driven vehicles, but this does not alter the fact that steady progress is being made with the introduction of battery vehicles for industrial and commercial purposes of all classes. The initial prejudices against this method of transport are being steadily broken down, and it may be said with truth that in towns into which the battery vehicle has been introduced orders are being regularly given by firms who are anxious to emulate the example of the pioneers of this vehicle in these districts. The city of Glasgow is a typical instance of this tendency to create a fashion in electrics. The electricity supply undertaking, on the advice of its progressive head (Mr. W. W. Lackie), put a small half-ton van into service now several years back. Experience with this was sufficiently encouraging to justify the gradual acquisition of a small fleet. They are all Edison cars of 1½ and 3-ton capacity, the later machines being of the G.-M. Edison type. From the points of view of road surface and gradients, Glasgow would not have been considered, at any rate some five




*Orwell Battery Changing Device.*

years ago, as an ideal district for the regular use of commercial vehicles of the battery-propelled type. Many of the streets are exceedingly steep, and the traffic conditions are such that they must be traversed slowly and with frequent stops, both at cross roads, with which Glasgow seems to abound, and on account of intervening vehicles. It cannot, therefore, be argued that the hills can be taken with a rush. Similarly, there is an abundance of granite sets forming the road surface, and in some streets it is little better than the pavé of which Continental motorists have such vibrant reminiscences. It may justly be said, therefore, that Glasgow's experience of electrics today will be the experience of the rest of the country tomorrow, for already the municipality of Edinborough has ordered a 3,000-pound car for similar work, while the Liverpool electricity department has just taken delivery of a two-tonner.

An undertaking which has closely watched the results obtained by the Glasgow electricity department is the United Co-operative Baking Society of that city. This is one of the most important business houses in Glasgow, and one which requires an efficient and reliable method of road transport. The management decided to give an Edison battery vehicle a trial. They

have been so pleased with the results that they now possess a small fleet.

These vehicles are all driven by comparatively unskilled labor, which so far has experienced no difficulty in driving and controlling them. Although their maximum speed is low compared with that of petrol or steam cars, they are able to maintain a sufficiently high average speed to fit in admirably with the delivery requirements of the society. The vehicles are all of 3,000 pounds capacity, and have a maximum speed on the level of 12 to 14 miles per hour, with a range of 45 miles loaded on one charge of the battery.

Another field in which the battery-driven vehicle is finding great favor is that connected with overhead construction and repair work on electric tramways. A General Motors truck fitted with telescopic tower wagon has been recently purchased by the Southampton Corporation tramways department. The tramways departments of Belfast, Derby and Ilford, having respectively used this type last year and found them very satisfactory. The wooden tower is placed at the rear of the vehicle and is designed for extension in a vertical direction by means of a motor supplied with energy from the same battery which propels the vehicle. At the front of the car there is accommodation under an extensive wood canopy top for the driver and the repair staff. There is also ample accommodation in the body for a full kit of the tools required. This vehicle has proven extremely valuable in trolley tramway service, especially for emergency work. It can rush from the power shed or garage at a moment's notice, and if necessary can be geared to run at high speeds. Of course the big thing about them is their ability for moving slowly and evenly up to a curb and or post while making repairs and wending its way through traffic without a jerk, which have endeared it to the tramways linemen. In some measure its duties are comparable with those which obtain in fire stations, in which, of course, there are already in use many battery-propelled engines, escapes and other fire fighting apparatus.

### MOTOR OMNIBUSES AND THE UPKEEP OF ROADS

For long enough it has been a sore point with those who are responsible for the running of electric tramways that motor omnibuses should have the right of running on streets without bearing some proportion of the cost of upkeep, which is necessarily rendered more heavy by this form of traffic. It does indeed seem like adding insult to injury that these vehicles should have the privilege of running on paving for the upkeep of which the tramway undertakings are responsible. It now appears that a new clause has been inserted by the House of Lords in the Local Government Emergency Provisions Bill, prohibiting the use of any new route by omnibuses, except with the consent of the local authority or the Local Government Board. The new clause will not interfere with commercial or trade vehicles but is intended solely to apply to such vehicles as omnibuses, char-à-bancs, wagonettes, stage-coaches and other vehicles plying for hire or used to carry passengers at separate fares. At present these vehicles are only taxed to the extent of their carriage licences. This, of course, will enable the local authority to obtain contributions to the upkeep as the price of their consent. As a general principle, we do not think that it is wise that any branch of industry should be placed at the mercy of a competitor and, therefore, we feel that it would be much more satisfactory if some regulations could be adopted by means of which this class of traffic contributed a suitable amount to the upkeep of the roads, or alternatively that the tramways were relieved from such contributions as it undoubtedly will tend to stifle the use of such electric omnibuses used at present.

### BATTERY CARTS V. HORSES FOR DUST COLLECTION

When it is known that the Sheffield Corporation is to purchase a third electric tipping wagon for the cleansing department, it is important to notice a report which we mentioned in our last letter and now presented more fully to the readers of Electric Vehicles, presented to the cleansing committee by J. A. Priestley, the superintendent of the department. The report deals with the work of a couple of 2-ton wagons at present in use in comparison with horse labor. The results as submitted were:

NO. 1 VEHICLE (DAYWORK COSTS FOR 22 WEEKS)

| | |
|---|---|
| Refuse collected | 858 tons 6 cwt. |
| Total cost | £217 15 10 |
| Cost per ton | 5 0.8 |

HORSE LABOR (COST OF THREE MONTH'S WORK ON SAME DISTRICTS)

| | |
|---|---|
| Refuse collected | 167 tons 19 cwt. |
| Total cost | £ 59 1 9 |
| Cost per ton | 7 0.4 |

NO. 1 VEHICLE (NIGHTWORK COSTS FOR 21 WEEKS)

| | |
|---|---|
| Refuse collected | 1,142 tons 19 cwt. |
| Total cost | £130 14 8 |
| Cost per ton | 2 3.4 |

HORSE LABOR (COST OF THREE MONTH'S WORK ON SAME DISTRICTS)

| | |
|---|---|
| Refuse removed | 473 tons 11 cwt. |
| Total cost | £ 77 10 3 |
| Cost per ton | 3 3.2 |

NO. 2 VEHICLE (DAYWORK COSTS FOR SIX WEEKS)

| | |
|---|---|
| Refuse collected | 314 tons 4 cwt. |
| Total cost | £ 63 0 3 |
| Cost per ton | 4 0.1 |

HORSE LABOR (COST OF THREE MONTH'S WORK ON SAME DISTRICTS)

| | |
|---|---|
| Refuse collected | 204 tons. |
| Total cost | £ 38 16 0 |
| Cost per ton | 3 9.6 |

NO. 2 VEHICLE (NIGHTWORK COSTS FOR SIX WEEKS)

| | |
|---|---|
| Refuse removed | 406 tons 13 cwt. |
| Total cost | £ 37 18 8 |
| Cost per ton | 1 10.6 |

HORSE LABOR (COST OF THREE MONTH'S WORK ON SAME DISTRICTS)

| | |
|---|---|
| Refuse removed | 440 tons 8 cwt. |
| Total cost | £ 55 10 2 |
| Cost per ton | 2 6.2 |

The report adds "the district worked by No. 2 vehicle on day shift comprise the best in the city for horse labor and from the results obtained I am led to the conclusion that for bin refuse in Sheffield horse labor holds an advantage where the total mileage per journey for the electrics does not exceed three miles but beyond this distance, and at all distances on ash-pit refuse, the electrics show a decided superiority.

"When electrics can only be used for day work the position differs somewhat, as the vehicle costs cannot be divided over two shifts. So far as Sheffield is concerned, I am of opinion that in our system of day and night work the electric vehicle is a pronounced success, and I recommend the expansion of this method of collection as opportunity offers, particularly as it renders possible a scheme that can be realized in no other way, viz., the centralization of the work of the department to one depot and one destructor capable of dealing with the whole of the city's refuse."

It should be noted that the electrical energy for the charging of the batteries is generated at the destructor from steam raised by the burning of the refuse itself. The report stating that a charge of one pence

per unit being made against the car, which is generally considered high.

*The Electrician,* in commenting on the report editorially, had the following to say:

An item of importance in the report reads as follows: "A charge of 1d. per unit is made against the vehicle for current used, but this does not represent an actual expenditure, as the electricity is obtained from the destructor installation, and the refuse consequently produces power for its own collection." We think that the last phrase might very well be used as a powerful selling argument for this type of vehicle. It is a condition of things which cannot obtain in any other form of propulsion for dust-collecting vehicles. The figure of 1d. per unit in these circumstances is on the high side, as it is not an accurate figure of the cost of electricity generation from towns' refuse. Energy at 1d. per unit is, however, offered by a large number of public electricity stations throughout the country, and therefore it may be accepted as a useful figure for comparing battery-driven with other classes of vehicles for this kind of work. Another feature of interest attaching to the report is the employment of battery vehicles in so hilly a district as Sheffield. The success of the vehicles in such a locality should do much to remove the prejudice which still undoubtedly exists against accumulator road traction. This prejudice is not entirely confined to vehicle users. It exists to a lamentable extent among electrical men, and not a few of them contral station engineers. We have consistently urged that the battery-propelled vehicle, *in its own field,* is unrivalled by any other power-propelled vehicle, and that abundant proof of this claim would be forthcoming so soon as the vehicles were tested under operating conditions side by side with other methods of traction. So far as refuse haulage is concerned, the central station engineers may look askance at the use of accumulator vehicles where the charging is done from the destructor plant. This would, however, be an extremely narrow view to take of the situation. The more battery vehicles there are on the road the greater will be the tendency to make use of them in their proper sphere of labor. There still remains an abundance of trades and industries in which they can be satisfactorily employed and derive their energy from the town's mains. We feel sure that Mr. Priestley's experience at Sheffield will be utilized to the utmost by those who are at present pushing the sale of these vehicles in this country. Cleansing superintendents and officials of a similar class will be made ready converts where figures, based on operating experience, are available.

## Want Change Made in Delaware Law

A movement for the repeal of an act which prohibits entrance into Delaware of motor trucks without a Delaware license has been indorsed recently by the Motor Truck Association of Philadelphia, at its regular monthly meeting at the Adelphia.

Joseph Bancroft, Jr., of Wilmington, explained to the members of the Philadelphia Association that an effort is being made to repeal the act, and that action would be taken by Delaware motorists prior to the presenting of the first bill in the Delaware Legislature.

Delaware license trucks are permitted to come into this state under a Delaware license.

## Ready to Market Chair Cars

The Motor Chair Sales and Operating Company, recently incorporated under Illinois laws for $50,000, have its factory arrangements completed and will be in position to deliver its electric motor chair to individuals and dealers commencing July 1.

This vehicle has created a great deal of attention



*Special Design Chair Car.*

in the parks and on the boulevards and there is every evidence of this company doing a large business.

Offices have been opened at 808 Westminster Building, Chicago, where Byron Mills will have charge. Mr. Mills reports a number of sales. The illustration shows one of the special models recently built for a customer for use at Palm Beach. It is a rattan body which is very light and comfortable. Several new models are being arranged with Cape Cart tops.

## Edison Model Chicago's Offered

The Walker Vehicle Co. has been making delivery on its new Edison model Chicago Electrics during the past few weeks and for the first time since the National Show, the factory has caught up far enough to be able to promise immediate deliveries.

The fact that all deliveries on these cars up to the present time have been scheduled to purchasers, indicates clearly the favor with which the new design is meeting.

The sales of Chicago Electrics to date have been more than double those of last season. The steady growth in popularity of this Chicago-made electric is the logical result of a product designed and built by an organization of experts on electric vehicle transportation.

The Walker Vehicle Company's broad experience on every phase of electric vehicle transportation covering the commercial car as well as the passenger car field, places the organization in splendid position to design, construct and maintain electric vehicles that will assure satisfaction, service and economy.

The sales of Walker trucks have shown a very healthy increase and for the past few months, the factory has found it necessary to operate a night shift to meet demands. Two four-tonners were recently sold to the Fair department store in Chicago.

# Fashions for Milady of the Electric

*As seen on her way to and from the Country Club*

*THIS season there is a great variety of garments offered for sports and outing wear at the most reasonable prices. Often they are copies of the best imported models.*

*THAT fashionable clothes that delight the woman of discernment are not necessarily expensive clothes is shown by these sketches of garments from the sales room of Chas. A. Stevens & Bros. of Chicago.*




*Sport Coat of Pongee, Rose Blue, Polka Dot.*

*Jersey Sport Coat, Green, Tan, Rose, Copenhagen.*



*Poplin and Black and White Check Suits.*

*Striped Taffeta Suit, Variety Stripes and Plain.*

*Serge Suit, Braid Trimmed, Navy and Black.*

*Serge Suits, Hand Embroidered, All Shades.*

# Motor Fashion Revue

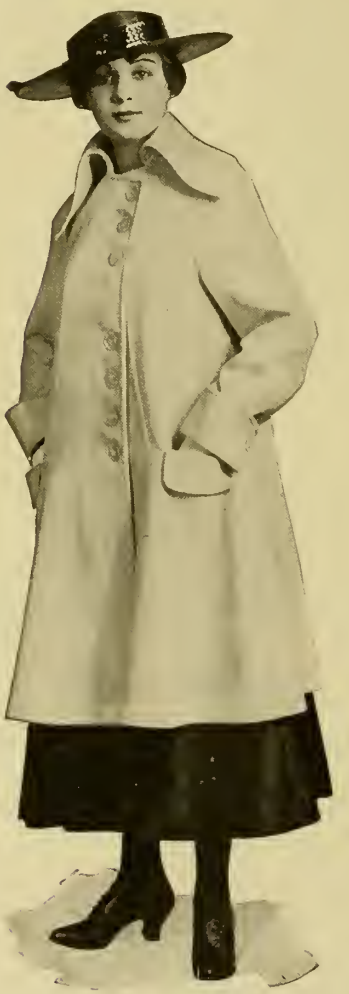
*The Marie Doro auto cap and the Elsie Janis motor bonnet are reproduced here by courtesy of Kunstadter Brothers, Manufacturers, Chicago.*

*These modish garments are all by the expert designers of the shops of Percival B. Palmer & Co., of Chicago.*




*Illustrates the new Elsie Janis Motor Bonnet. It is made with a draw string back, making it adjustable in size and snug fitting. When not in use is collapsible and can be carried in the purse or pocket of the wearer.*

*The coat below of white chinchilla suitable for all occasions. The white cuffs, large pockets and cape collar make it especially attractive.*



*The ultra smart model here pictured to the left is of black whipcord. The belt drops a little below the normal waist. New shaped sailor collar has a detachable collar of tan pongee. Lined to waist with peau de cygne.*



*This shows a Marie Doro Auto Cap with hemstitched chiffon streamers, which are used as a veil.*



*Coat of black taffeta, displaying the fullness laid in soft pleats under a self belt at waist. A pleated cape-like collar is shown, also deep cuffs. Comes also in navy.*



# Central Station Promotion of Electric Vehicle Use

*Delivered at The N. E. L. A. Convention at Chicago*

BY WILLIAM P. KENNEDY

IF THE establishment of the Electric Vehicle Section in the National Electric Light Association marks an epoch in the electrical industry, fundamental questions arise as to the manner in which this closer union of the central station and vehicle interests is to be made of conspicuous mutual advantage.

To judiciously recommend to the central stations what they should do, the whole problem must be viewed from their standpoint rather than that of the manufacturer of vehicles or their equipment constituents. The following inquiries are therefore pertinent:

Is the extension of electric vehicle use of serious interest or benefit to the central station?

Is the central station in a free position, legally or logically, to make the use of electric vehicles, in general public service, a project of its own which will harmonize with the present conduct of its business?

Is the central station so completely occupied or concerned with the conduct of its existing activities as to be more justified in sticking to what is its own business now rather than reaching after something which must require a large amount of time, energy and money to properly develop it as an auxiliary branch of business?

If interested, to what degree of magnitude shall the central station develop this project as a new undertaking?

Shall it work in the direction of passenger car development or the commercial motor truck; and if both lines must be built up, in which direction will the central station reap the most permanent benefit?

Another way of summing up this general query is; shall the vehicle business development be classified by the central station with its present activities for the promotion of sundry lighting and domestic utilities, or shall the project be regarded on a par with new business of great magnitude such as many central stations are seeking in the direction of street railway load and steam railway terminal electrification?

If the central station decides to keep the vehicle in the same class with its minor domestic apparatus load development, there is not much more to be done than to continue the limited efforts which are being given to it at present in the general conduct of this division of the central station business.

If the proposition is to be classified with the major new load development, then serious attention must be promptly given to the matter by the leaders in the administration of central station properies.

Immediate attention is necessary, even if a decision should be reached adverse to the development under consideration. Urgency is essential because a crisis exists at the moment which will determine whether the electric vehicle business will simply float along in a passive state of existence, with regard to other motor vehicle development; or whether it can be invigorated to such an extent that it will maintain its place, *in cities,* on a par with other vehicle development; with consequent superior revenue to interested central stations. This crisis has arisen from two causes, one relating to the passenger car and the other relating to the motor truck.

In the passenger car field, it is quite evident, even to the most casual observer, that the gasoline passenger car business has progressed in each of the past few years in a phenomenal manner, with quantity production from most of the factories which was previously undreamt of, and with a consequent fall in the market or selling price; which if it continues will simply stulify the electric passenger car business to that very limited field where it will be selected by the wealthier class of purchaser on the sole basis of comfort and elegance.

With regard to the motor truck field, there has been an extraordinary and abnormal development in the demand for gasoline motor trucks for military purposes in Europe. Previous to this demand few of the manufacturers of this type of machine had produced or sold trucks in quantity as the electric vehicle manufacturers had. Consequently, they knew little of the economic possibilities within their factory or sales departments which are attendant upon quantity production of this type of vehicle. These export orders have enabled them to clear out their old or obsolete materials; to organize their equipments for quantity production; to learn what could be done in reducing prices based upon quantity orders; and have created a pressing desire, on their part, for the continuance of such quantity business. Therefore, just as soon as the present export demand ceases or declines, these gasoline motor truck producing organizations will proceed to develop the domestic business in competition with one another, with such zest and vigor in effort, and the spending of such quantities of money for exploitation, that the already enfeebled electric vehicle manufacturers will be unable to make any progress against them. Under such circumstances, the electric vehicle load opportunities for the central stations will disappear.

With this view of the situation immediately ahead, and assuming that it may be regarded advisable to develop this type of load, what would be the determination of a group of central station owners if they sat down to consider how they would spend their own money in this project?

In the first place, any limited expenditure for co-operative advertising could only be regarded as having very transitory value. It would probably aid in keeping the electric vehicle business alive for the time being, but that is all. In the face of the coming situation as described above, it could not be regarded as having large value as invested capital towards "good will" in a growing business; although it might be the means of putting some vehicles upon their lines.

To provide for building up a permanently increasing load, something of much more radical and substantial character would be necessary. Not radical in the sense of departure from the principles of central station practice, but radical as compared with anything that has heretofore been done by the central stations to promote electric vehicle use.

The line of competitive attack upon other types of transportation apparatus employed, or to be employed, in cities, can only be successfully made upon the basis of *guaranteeing the superior economy of the electric vehicle.* If users of vehicles, passenger or commercial, could be assured of what *we know* to be the low cost of operation, by means of a *garage service covering the upkeep and maintenance of the complete vehicle in constant working condition for a flat price per annum,* these users would unquestionably adopt the electric vehicle in preference to any other type of machine. No competition on the part of gasoline vehicle makers could withstand such guaranteed service cost. They could have no such organized effort in their behalf as the central station can exert or promote in this direction.

Service and the cost of it is what every user is primarily interested in. The central station can render such service, but it would probably be more practicable to provide for it through a collateral organization. A surprising profit can be made by such operations, aside from the advantage of permanent increased load of such size as to rival the existing load of any central station organization, depending upon the degree to which such exploitation is carried.

No permanent investment more than 3 per cent of the amount which the owners put into their vehicles would be required for equipment with which to conduct such an enterprise; and 30 to 40 per cent of what the user would pay for such service would be net revenue, the cost of operation being not more to the user than if he furnished the service himself.

In addition to this general maintenance plan, other special types of service, such as the "Battery Service System," can be added wherever they can be used to extend the scope of the business.

Such an undertaking would be well within range of the legitimate activities of central station organizations. It would be nothing more than adding to the present lighting service and power service a vehicle service, the principal function of which would be to supply energy and maintain this type of energy consuming apparatus in working condition; in a somewhat similar but larger way than the methods now employed to maintain lamp equipment, or the several other types of devices which are supervised in such a way as to insure to the central station that they continually remain in condition to consume its energy supply.

If carefully examined, this undertaking as a business proposition has features which are far superior to any of the lines of development in which the central station is now engaged. In most of the present activities, considerable sums of money are spent to develop a demand, on the part of the public, for the employment of the utilities which the central station thus fosters, and it has taken some thirty years of persistent effort to bring the public to its present limited appreciation of the value of electric illumination.

In the field of application for the stationary industrial electric motor, missionary effort of the most laborious and expensive character must be conducted to break the public away from its traditional inclination to use other forms of motive power. While in the field of heating and other domestic conveniences, the limited progress being made seems out of all proportion to the cost of securing this type of business.

On the other hand, if we consider the prospect for the motor truck, we find that the demand is already in existence, and is being nourished and cultivated by the expenditure of vast sums of money such as was never previously expended in the history of any other commercial development. The change from older forms of transportation is under way, and is already accomplished in most of the larger cities in the passenger vehicle field. A few short years will see the impending change in the commercial field complete. Nothing can resist this change as the fundamental law of necessity is forcing the issue.

Therefore, it will be seen that here lies a field for central station activity which is different in character from any of its previous undertakings, inasmuch as the public is already in the attitude of wanting what it may have to offer without the central station having to purchase and build up this condition by years of patient and laborous activity, with the expenditure of such quantities of money as has been legitimately necessary in nearly all of its other undertakings. Furthermore, in all of its previous activities it has been compelled to carry the burden alone. In this instance, it can capitalize upon the callaboration and expenditures of hundreds of other organizations in the automobile field which are promoting a similar demand on the part of the public, and it simply remains a question whether, in the present period of transition from the use of animal power to motor power in city transportation, the change will be almost completely effected with the use of internal combustion machines, or whether the central station industry can be aroused to a state of interest and energy where it will demand and secure a large proportion of the conversion by means of electrical energy consuming apparatus.

In considering such an enterprise, the central stations have every possible advantage that could be demanded in their favor. Their own organizations are almost perfect in the conduct of their commercial operations. They are long and well established, and securely entrenched in the favor of the public. It may be truly said that they have no serious competition. They are already doing business with nearly every single user of transportation equipment in their respective communities. Such a relationship assures them immediate entry into such negotiation with these users as may be necessary to accomplish their purposes. They already have at their command vast sources of energy supply which are inactive for a large proportion of every day in the year. The idle period in each day is the time when the prospective demand for electric vehicle energy would be required. Most of them have existing departments using or caring for this type of vehicle which has already educated them to the value and economy of this type of machine. There is abundant testimony available to them from all parts of the country, and of the most convincing character that this type of machine can and does perform city transportation service at a cost substantially below any other type of apparatus used for this purpose. In fact, there is nothing of an experimental nature in any of the elements involved in the establishment of a new branch of their business which would furnish to users of transportation equipment an energy and maintenance service which would be practically parallel in character to the types of other service which they now offer as their main existing business. Furthermore, they would not have to depart in policy from any of the principles which they have laid down as fundamentals for the conduct of their business, and it is fair to say that no other unit of current consuming apparatus could return revenue equivalent to that which may be secured from energy and maintenance service to the electric vehicle.

It may be surprising to learn that the existing volume of business of any central station could be doubled by securing to it the total of this electric vehicle service load available in its district. There may be some few exceptions to this in the case of companies supplying railway power, but even in these cases the very superior return which can be secured, per unit of energy sold, for electric vehicle service, should make this field even more attractive than the railway load field. Two other pertinent points are worth considering, and these are the facts that no additional investment is required for power plant equipment, and that once this load is secured upon the lines it will permanently remain there yielding revenue from year to year, and is likely to increase rather than decrease with the development and progress of each respective community.

The probability of these facts may become more evident when we look around and take account of all the horse equipment which is at present employed, and bearing in mind that the prospective removal of each animal has its contingent value in the consumption of energy is supplanted by electric vehicle equipment. The total load to be thus secured is of enormous value. In several of the larger cities, this would range between 50,000,000 and 100,000,000 kilowatt hours per annum, making due allowance for only a reasonable proportion of the total conversion as a maximum possibility; and in many of the cities of secondary size the maximum load possible is between 30,000,000 and 50,000,000 kilowatt hours per annum. If the sale of this energy is coupled with the sale of an attendant service, such as the maintenance of the apparatus proposed, there is no reason why the rate for combined service should not include, as one of its silent factors, a rate of 4 cents per kilowatt hour for energy, which is about the figure agreed upon by most of the users of groups of these vehicles as a fair representation of their present cost.

The tonnage handled per annum in each city may also be used as a comparative factor indicative of the revenue to be secured by supplanting the present type of horse vehicle with electric machines. That this is a large factor per annum becomes evident when we consider that nearly every visible object and all material existing or consumed in cities has, at one time or another, been transported there by vehicles. There are some few exceptions to this, but they are insignificant in consideration of the total, and when we regard the volume of our transitory commercial business, and the constantly recurring transfer of the quantity of merchandise involved, as well as the total of our consumed and waste materials, the question of this total transportation and its cost becomes a matter of serious business import. If a reasonable proportion of this could be converted to electric vehicle transport in which the public electric utility organizations had a revenue interest, this would rival in magnitude any other project ever undertaken by them.

It has been stated, with relation to the attitude of the central station, that such a prospect for business is "not nearly so great in ultimate possibilities for the central station as the universal introduction of motor drive and the displacement of all other known methods of power supply in a given locality." There is, however, this important difference that the former business prospect is immediate, as the change in transportation equipment is actually under way independent of any effort whatever on the part of the central stations, and it only remains for them to go out and secure whatever proportion of the change may be worth the effort to get it; while in the latter prospect, only very gradual accumulation of business can be hoped for over a long period, the entire price of securing this being paid for by the central station.

To arouse interest in a matter of this kind in the central station field is not an easily accomplished purpose, and success would probably require the introduction into this division of central station enterprise of some of the energy and efficiency which has made the automobile business so strikingly more progressive.

There is also to be contended with the existing attitude and belief formerly justified, that the central station business has been a superlatively successful one, in marked contrast to other lines of endeavor. But this position of superiority no longer exists in contrast with the automobile business, which in a few short years, by the remarkable quality of skill, energy and cumulative finance with which it has been endowed, has reached the volume of $1,000,000,000 per annum, which is more than twice the annual value of the entire central station business. It has also set a brilliant example in the utilization of modern industrial and commercial facilities which has dimmed some of the glory of previous business achievement. It may be well, therefore, for the central station industry to recognize its temporary opportunity in this particular field of exploitation; to take its cue from the finesse and activity of the automobile industry; and add permanently to its revenue a fair proportion of the yield which may be had by capitalizing upon the change being forced, from old to new, in methods of city merchandise transportation.

## Sales from Consular Work in South Africa

The sale of an electric truck and a number of electric motors to the municipality of Port Elizabeth, South Africa, were among the definite results that followed consular trade-extension work during the December quarter. The actual sales were consummated by American commercial travelers, but interest in the American articles was first aroused by catalogues and information supplied by Consul E. A. Wakefield.

## Interesting Installation in Prest-O-Lite Battery Plant

As an important part in its program for the production of electric storage batteries on a large scale, for all purposes, the Prest-O-Lite Company, Inc., of Indianapolis, Ind., has just recently completed the installation of an electrical charging apparatus having many new features which are of interest to electric vehicle and operating electrical engineers.

The installation current supply has been carefully worked out with the idea in view of utilizing the discharge current from the batteries on the "forming" tables by



passing it back through a "booster" generator where it is raised to the charging voltage and then used over again. Another of the striking features of this installation is the novel method of automatically disconnecting the incoming a. c. current, which is 4,100 voltas, and disconnecting the d. c. generators from their loads to prevent the discharge of the batteries back into the machines in the event of any great fluctuation in the a. c. voltage, overloading of the apparatus, or racing of the motor.

Current is supplied to the control desk by one 200 k. w.—250-volt d. c. generator, direct connected to a 4,100-volt a. c. synchronous motor. There is also a 50 k. w.—100-volt "booster" generator, direct-connected to the other end of the motor shaft.

The direct current machines feed into three bus bars and are so arranged that when a line of batteries is being discharged, the current from them is carried through the 100-volt generator where the voltage is raised from 150 volts, which is the discharge rate, to 250 volts and is then returned to the charging busses, thus effecting a large saving in current.

The motor-generator set is controlled by a four-panel vertical board built by the General Electric Co., shown in the rear of the illustration, arranged as folows:

Panel No. 1—Carries the 4,100-volt A. C. incoming line from the light and power company's generators. On this panel are mounted also two circuit breakers, one for the factory lighting system and the other for 220-volt, three-phase power.

Panel No. 2—Controls the 4,100-volt, 365 k. v. a. synchronous motor.

Panel No. 3—Controls the 100-volt d. c. generator.

Panel No. 4—Controls the 250-volt d. c. generator.

An "alarm" circuit is provided, connecting the trip coils of both d. c. circuit breakers and the incoming line oil switch. The "alarm" circuit is controlled by time limit relays so that if the outside a. c. power supply drops down too low or is suddenly cut off, the motor will be automatically disconnected from the incoming line and the d. c. generators will be disconnected from their loads, thus preventing the direct discharging of batteries back into the machines. The "alarm" circuit provides the same protection to the apparatus in the event of an over-load on the apparatus.

Much credit for this unique installation is due Esterline and Angus, consulting engineers, of Indianpolis, and to the manufacturers of the motor-generator set and controls, the General Electric Company, of Schenectady, N. Y.

## Acid Proof Battery Room Floors

The construction of battery-room floors has been carefully studied by the New York Edison Company, the accompanying illustrations showing a floor construction now used. Briefly, the floors are made impervious to acid by a covering and are graded so that they will drain toward one side where a gutter is provided which empties into a lime box. The latter is employed to neutralize any acidified water which may be collected before it is discharged into the sewer.

The acid-proof coverings are laid on ordinary concrete floors reinforced by steel girders. Over this a 1:2:4 mixture of concrete with a cement mortar finish is placed. The surface is then painted with hot "Hydrex" compound and covered with three layers of butt-joined acid-proof Hydrex felt, the strips being run with the flow line of the room. The joints are bonded with hot compound. Around the borders and under the drain box additional layers of felt and compound are employed. A second layer of 1:2:4 concrete is placed over all, finished and painted like the first, and covered with two crossed layers of acid-proof felt. Laid on this with their longest dimensions in the direction of the flow line of the room are 8-inch by 4-inch by 2.25-inch vitrified bricks, the spaces between which are filled with 0.25-inch rope separators and hot compound. The thickness of the first layer of concrete is tapered from the gutter to the opposite side of the floor to give the finished floor an 0.8 per cent grade.

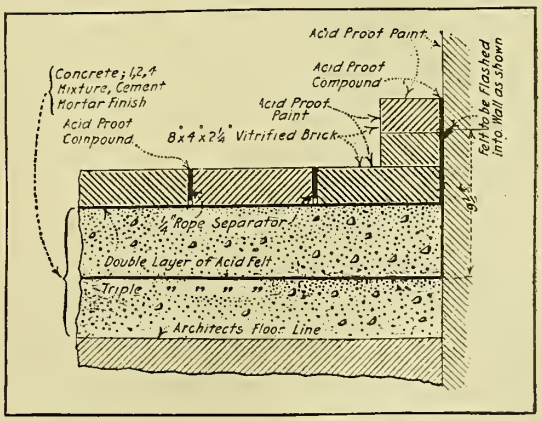



*Fig. 1.—Battery-Floor Construction Near Wall, Showing Layers of Concrete Separated by Acid-Proof Coverings with a Brick Surface.*

The gutter in turn is given a 0.5 per cent grade. The minimum thickness of the floor is made about 9⅛-inch.

Where the acid-proof covering must pass over

girders they are first covered with neat cement and a sheet of lead, as shown in the accompanying drawing. Around the edges of the floors for the battery rooms

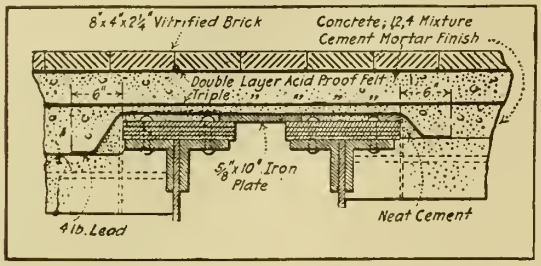



*Fig. 2.—Method of Protecting Steel Girders with Cement and Sheet Lead.*

are built low barriers of vitrified brick coated with acid-proof paint and separated from the walls by Hydrex felt and hot compound. —*Electrical World.*

## New York Plans to Tax Truck Heavily

There is a movement on foot in New York State to have the Legislature impose a special tax on motor trucks and busses on the ground that these vehicles damage public highways. No doubt this kind of traffic gives a severer test to the wearing qualities of the highways than was anticipated at the time of the construction of many of the so-called good roads.

In this connection, however, it must be borne in mind that it is a fundamental proposition that the highways should be free—free for the benefit of all the people. In other words, the taxation of automobiles to maintain roads, or the imposition of special taxes on motor trucks, for example, are not in keeping with the time-honored conception of the public highway.

The cost of motor car operation is today one of this country's most economic problems. It is uppermost in the minds of the great majority of automobile owners. Coincident with the talk of increasing taxation, the cost of gasoline has gone higher and higher until it is double what it was six months ago.

But good comes from evil, from the standpoint of the motorist, because the solution of the problem of the cost of operation is being worked out as never before. Owners and prospective buyers of cars are working it out themselves, because they are coming to a full realization of the fact that the way to meet the high price of gasoline, and deal with other cost-of-operation problems, is to operate more efficient cars—cars which are simpler and lighter, and therefore more economical.

Undoubtedly the next few years will witness revolutionary changes for the better in respect to all phases of the cost of operating motor cars.

## Truck Tire Press Installed in Mobile

Truck owners of Mobile, Alabama, and vicinity will be interested to know of the installation by the Adams Machinery and Manufacturing Company of a 200-ton hydraulic press for pressing on heavy solid rubber truck tires, which is said to be the largest press of its kind in the country outside that of the Akron tire plants.

Heretofore it has been necessary to send these heavy truck wheels either to Atlanta or to Akron, Ohio, to have this work properly done, which naturally cost considerable for freight or express, and also caused a great deal of delay.

## Town Has an Electric for Every 500 People

Summit, New Jersey, with a population of ten thousand in the rolling country in the northeastern part of the state, holds what we believe to be a record. It has twenty cars, twenty dependable electrics—one to every five hundred inhabitants! At this rate we should have over 200,000 electrics in the United States today instead of 70,000. At present they are all located within a circle of one and a half miles in diameter, they comprise fifteen pleasure cars and five trucks, ranging from a seven hundred and fifty pound capacity Ward, to an Atlantic two-tonner.

The Commonwealth Electric Company, which supplies the community, has a charging station located at the corner of Bank street and Beechwood road in the rear of its main office where it furnishes current up to 75 amperes direct, at any time of the day or night. Another charging station is also maintained at the plant, where current up to 100 amperes can be obtained any time during the twenty-four hours. These stations are supplemented by the charging station of the electric garage operated by the Summit Express Company which has installed a 15-kilowatt Martin Rotary with five Cutler-Hammer charging panels.

During the first of the year the Commonwealth Electric Company inaugurated an inspection and service department looking after the inspection of batteries and cars in general. There is no charge made for this monthly inspection, unless it is necessary to overhaul the battery in some way, such as an overcharge on account of sulphating, equalizing, changing jars and the like. When such work is required a small amount is charged for the labor and material.

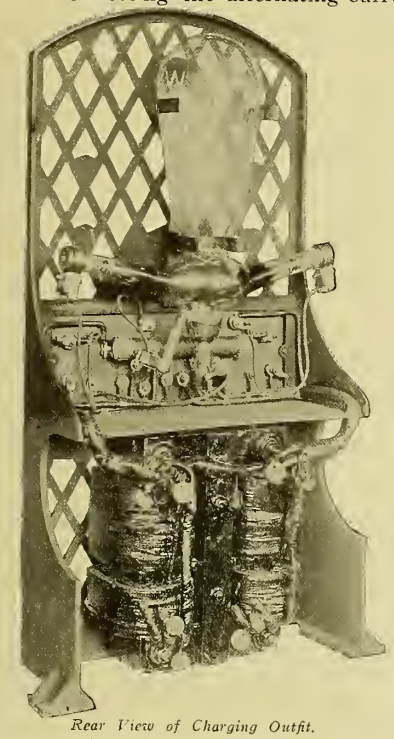
H. F. Taylor, the superintendent, states that he attributes a great deal of the success with electric motor cars to the extensive service it is rendering at an extremely low rate for this quality of work. It evidently is appreciated by the public for up to the first of May the company has added five cars since the first of the year, three of the sales being of commercial cars and two pleasure cars.




*During Easter Week There Was Considerable Rivalry Among New York Dealers in the Decoration of Their Windows. This Shows the Detroit Electric Headquarters, Which Won Easily.*

## Westinghouse Charging Outfit

To meet the demand on the part of electric vehicle owners for a simple, convenient, reliable and economical means of charging batteries the Westinghouse Electric & Mfg. Company of East Pittsburgh, Pa., has developed a rectifier outfit which consists of a transformer-reactance and Cooper-Hewitt rectifier bulb mounted on a cast iron frame. The transformer is so arranged as to deliver, without the use of extra resistance or reactance coils, the gradually decreasing current best suited for battery charging. Terminals are provided for connecting the alternating-current lines



*Rear View of Charging Outfit.*

and the battery circuits to the outfit. Fuses for overload protection are placed in both the alternating and direct-current circuits. A simple starting switch, and two link connectors, by means of which transformer connections are changed to suit any particular battery and line voltage within the limits of the outfit, are additional features.

The bulb is tilted by means of a handle on front. Provision is made for mounting a voltmeter and ammeter directly on the frame.

This outfit has been designed primarily for the business man who is not an electrical expert and who cannot afford to spend his time caring for the charging apparatus.

## One-Light-for-All Vehicles Bill Is Passed

An ordinance to require all vehicles, whether motor or horse-drawn, to carry a light at night, has been recently adopted by the Pittsburgh, Pennsylvania, Council. The original ordinance required that vehicles carry two lights, one in front and one behind, but was amended in committee so as to demand but one light, which may be underneath the vehicle, if desired. The eight members of Council present voted for the bill.

## The Real Number of Trucks

It has been stated so often that "there are this-or-that many electric trucks in the United States today," that it was necessary for the interest of the industry for ELECTRIC VEHICLES to make some actual count and arrange the states in the order of the number of trucks actually being used, for which licenses were issued last year. This entirely eliminates all junk yard jobs and those used one or two days in the year. The showing of nearly 30,000 trucks is a brave one and although outnumbered by the gas trucks nearly 7 to 1, we are changing the proportions fast.

| Rank | State | No. of Trucks | Rank according to miles of pavement in state |
|---|---|---|---|
| 1 | New York | 4,060 | 1 |
| 2 | Illinois | 2,781 | 4 |
| 3 | Ohio | 2,660 | 5 |
| 4 | Pennsylvania | 2,520 | 2 |
| 5 | Massachusetts | 1,940 | 3 |
| 6 | Iowa | 1,870 | 22 |
| 7 | California | 1,820 | 6 |
| 8 | Michigan | 1,610 | 9 |
| 9 | Wisconsin | 1,330 | 10 |
| 10 | Indiana | 1,120 | 11 |
| 11 | New Jersey | 960 | 8 |
| 12 | Connecticut | 720 | 18 |
| 13 | Minnesota | 600 | 17 |
| 14 | Missouri | 537 | 7 |
| 15 | Texas | 450 | 12 |
| 16 | Kansas | 310 | 27 |
| 17 | Rhode Island | 310 | 15 |
| 18 | Nebraska | 300 | 26 |
| 19 | Maryland | 175 | 14 |
| 20 | Washington | 175 | 23 |
| 21 | Colorado | 150 | 28 |
| 22 | Oklahoma | 150 | 32 |
| 23 | Georgia | 140 | 25 |
| 24 | Kentucky | 125 | 19 |
| 25 | Tennessee | 125 | 13 |
| 26 | Virginia | 109 | 24 |
| 27 | Maine | 90 | 30 |
| 28 | Oregon | 80 | 20 |
| 29 | Alabama | 62 | 29 |
| 30 | New Hampshire | 52 | 36 |
| 31 | North Dakota | 45 | .. |
| 32 | North Carolina | 40 | 37 |
| 33 | West Virginia | 40 | 34 |
| 34 | Delaware | 38 | 33 |
| 35 | Vermont | 35 | 42 |
| 36 | South Dakota | 30 | 41 |
| 37 | Utah | 30 | 39 |
| 38 | District of Columbia | 25 | 16 |
| 39 | Florida | 22 | 31 |
| 40 | South Carolina | 20 | 35 |
| 41 | Louisiana | 20 | 21 |
| 42 | Montana | 15 | 40 |
| 43 | Arkansas | 14 | 38 |
| 44 | Idaho | 8 | .. |
| | Total electric commercial cars | 27,653 | |

There is no doubt a direct connection between the number of miles of paved streets in cities over 30,000 inhabitants and the number of trucks used. When this proportion drops it is evident the truck agents and the garages and central stations need prodding to awaken them. A good example of what can be done is shown by Iowa which, although ranking twenty-second in miles of paved streets among towns of 30,000 or over, is sixth on the list with 1,870 trucks. On the other hand, Missouri ranking seventh in paving and much better charging facilities in the state, ranks fourteenth, with only 537 trucks, a remarkably poor showing. Missouri should borrow some Iowa salesmen.

## Extracting a Customer's Check Painlessly

"May I have an hour of your time?" I looked around at him irate and gasped, but I said nothing, for he appeared to be aglow with a pleasant smile of confidence, which seemed to somewhat allay my feeling of anger toward everything in general, and the automobile world in particular. Such a remark as he had just made, under ordinary circumstances, would have been astonishing, to say the least, but under present exaggerated conditions, it seemed almost impossible that I could have heard correctly. My first thoughts—who let him in, the impudence of this impostor, and a dozen other that popped up simultaneously—lost their weight in favor of my interest to learn what this dapper, self-confident young cub had to say. The only words that would come to me were: "Well, what do you want?"

"First of all, I want to extend my sympathy for your unfortunate experience of this morning. I think I know just how it has upset your entire day's work by making you so late at your office, and starting the whole day wrong for you?"

I snapped back: "In heaven's name what do you want? I have no time to waste with you, or anyone else."

"I realize that," said he quietly, "that is why I ask for only one hour's time. You are a shrewd business man, and I would not dare ask you for anything which I did not know would prove a good investment for you. Therefore, my request for only one hour." This fellow, thought I, is both maddening and interesting, I might as well hear him through. "Well," said I, resignedly, "go ahead."

"You see," he said, "I am one of the crowd that saw your accident this morning, and just one look at your tired chauffeur told me the whole story. I know the unusual social affairs that have been going on the past week, and I know that the social activity of your family has kept them on the go day and night. This has meant that your chauffeur has been attempting to do the impossible, by being at the service of your family afternoons and away into the night, and at the same time ready for your early morning call to drive you to the office. Do you realize that you have been expecting that man to be in service eighteen hours every day, for the past two weeks? He may be a strong man, but he, no, nor anyone else, can stand such a pace. Just remember, your family rests until noon each day, and as for yourself, don't forget your plea that you are too tired to go to this or that function, and further when you do go, that you invariably leave early in the evening so that you may get your needed rest for the next day's battle."

This young champion of my chauffeur was beginning to make me feel just a little guilty for so roundly chiding old John, our chauffeur, for what had seemed cussed carelessness to me, in colliding with the street car, on the trip to the office. True, he had been overworked, and probably was half asleep when the accident occurred. What else could I expect, under the circumstances, than an unsteady hand, poor judgment, and faulty sight from the poor fellow? But I dismissed my thought of the abused John by asking: "What do you want?"

"I demand simply this," he said, "stop working your chauffeur in the morning. It is the only human, as well as the only safe thing to do. If you keep on as at present, you will continue to have accidents, not only in the morning, but you will also be endangering the lives of those of your family."

"Well," with an air of finality, "if you want the job of assistant chauffeur, you are hired from now on. If my car is repaired by tomorrow morning, you may drive me to the office. Be in front of the house at 7:30 and it is understood you are to work for me personally, most of the time."

"Thank you, sir," said he. "We can decide on the wages later. I shall be ready at 7:30 tomorrow." Then he left.

Lord! what a day I spent! Accomplished nothing, absolutely nothing. Lost most of the time trying to get a car and driver for my family to use. They would not ride in the rattling taxicabs; they said it was dangerous. The P——d Company offered me one of their twelves, but could give me no driver, and, unfortunately, I had let the new man, just hired, get away, without even learning his name or address. John was entirely out of the running. In fact, he had gone to the hospital for probably a two weeks' stay. How I longed for the good old days when we were neither too proud nor too tired to walk.

Next morning, my car was still in the shop, so I was about to order a taxi, when I glanced out of the window, and saw my smiling friend of yesterday, comfortably seated in a snappy, business-like looking car, apparently ready for the 7:30 appointment. There is a real man, thought I. He knows how to meet a situation. He has borrowed a car and is ready for orders. I will certainly keep that fellow, and pay him well.

Now we are off. "What sort of a car is this?" I asked. "It rides like a dream. No shocks or bumps. Where are your gear levers? Does that speedometer say twenty-five miles? Not so fast, we will be arrested again." Then he turned that smile on me once more, and said: "This is one of the new electrics. The car you need for your use. Let your family have the limousine and chauffeur, but here is the car for you. It will take you eighty miles on a charge. You see how it rides. Its speed, well, you have noticed that. No chauffeur, just drive it yourself; you will find it a pleasure. I heard a man say yesterday that driving his electric to his office in the morning was sort of a mental tonic which he would not attempt to do without. The price,—well, it will pay for itself in a mighty short time. Don't forget that this car is ready for use at any time, winter or summer. It never has to be toned up before starting. You never need wait in the cold to prime the self-starter on this car. It will be my pleasure to teach you to drive it on our return home from the office this evening."

"Well," I said, "so that is your story. I must admit the hour I gave you has been well invested. I have certainly learned something. When can you deliver me a new Detroit? But tell me, how did you happen to pick on me at such an unusual time as yesterday morning?"

"Here is my secret," he said. "I spend half of my time observing, and the other half selling. When I see an accident such as yours of yesterday, I get the license number of the car, and go after the owner immediately. If I can get an interview, which is the hardest part of the game, I always get the order. But my hour with you is up, please sign there. No, it is not necessary in your case to have the deposit check certified. My company knows you well."

## He Wanted the Batteries on the Roof

BY C. W. LONG, ANDERSON ELECTRIC CAR COMPANY.

A short time ago a prospect for an electric car—a man about 60 years old—informed a salesman for an electric automobile company that he would buy a car when he could find the company who would build to suit him, as he was well able to pay for what he wanted. The salesman could see nothing in his way for an order until the details of what was wanted were made known, then the blow—the prospect had designed a car without front or rear deck and demanded that the batteries be placed on the roof—and he was in earnest, too. (Don't laugh, there are many suggestions offered a manufacturer just as impractical.)

Without considering the practical side, the prospect had concluded the decks both front and rear were not needed and to his eye spoiled the beauty of outline. He did not realize that a battery weighed from 1,000 to 1,500 lbs., and that putting it on the roof would make a car topheavy, while the position of the battery in the up-to-date electric is not only the proper place for it from the standpoint of care, it is also a safety measure, making it next to impossible to overturn the car owing to the low center of gravity of the load carried.

It is surprising how few people there are who fully realize the amount of research work and money spent by the manufacturer of almost any article offered for sale to gain a product that will attract public favor. Every detail has to be worked out step by step until perfection, or as near perfection as possible is reached. From two to three years is sometimes taken in experimental work before the manufacturer is satisfied that he has reached the point where he can safely offer his product to the public.

An electric automobile is a composite of nearly everything that the world produces. American steers supply the hides and hair for the upholstery, or if Milady prefers, a French cloth is optional for her selection. South America supplies the rubber for the tires, Peru mines the vanadium that makes its alloy steel; Canada furnishes the asbestos that lines the brakes—every quarter of the globe pays tribute in the thousand and one substances manufactured into an electric automobile. Huge sums are paid designers and engineers to develop a car that purchaser's ideal.

Suggestions are always most welcome because it is only by criticism and suggestion that the manufacturer can hope to reach perfection. Public pulse must be felt, because after mechanical perfection is reached, style must be taken into consideration and the sale of an electric automobile eventually rests with public approval of style, beauty of outline, safety, mechanical simplicity and low upkeep costs are the combination of the up-to-date electric automobile.

## Komp Elected Lansden President

F. S. Komp, formerly secretary and purchasing agent of the Lansden Co., of New York City, has been elected president and treasurer of the company, succeeding A. G. McLaughlin. W. R. Garton becomes vice-president and general sales manager and N. A. Burgess, secretary. Mr. Garton is also sales engineer, with offices at 299 Broadway, New York.

## Changes in Goodrich Detroit Branch

The B. F. Goodrich Company announce that Paul T. Opper who has been assistant manager for many years of the Detroit branch has been promoted to manager to succeed H. J. Morehead who has just resigned.


# LUXURY WITHOUT EXTRAVAGANCE IN THESE DAYS OF HIGH COST OF GASOLINE

A CAR that is COOL in summer; WARM in winter; dustless, odorless and practically noiseless. A CAR that is SAFE for your wife and children, because of simplicity and splendid durability.

ECONOMICAL to a degree hard to realize by those whose experience has been with OTHER TYPES.

SPEEDY ENOUGH for any but those who would RUN THE RISKS extreme speed imposes.

NOT A SPORTING proposition, but a car for the FAMILY, for utility and quiet enjoyment, with the SAFETY and SANENESS that you insist on in all other departments of YOUR daily LIFE and BUSINESS.

THE ONE CAR that can be operated by any member of the family and will perform 98% of the demands made upon it.

AN EMBARGO ON GASOLINE if imposed by Congress against shipments to the warring nations, AS IS CONTEMPLATED, would increase the domestic supply SUFFICIENT ONLY to provide motive power for but ONE-THIRD of the estimated product of 1916 gasoline cars.

WHAT---with the present high price of gasoline, and the price steadily advancing---will be the COST A YEAR HENCE?

ELECTRIC CURRENT has been DECREASING gradually in price during recent years because the SUPPLY as well as the DEMAND have increased enormously.

Therefore, the ELECTRIC BROUGHAM is the car of the hour--because of its efficiency and its economy of maintenance.

THE ELECTRIC CAR Is TODAY the most practical, safe and ECONOMICAL of all motor vehicles.

## THE ELECTRIC AUTO DEALERS OF COLUMBUS

Michael Abel 208 EAST GAY STREET — Baker, Rauch & Lang — F. E. Avery & Son 1199 FRANKLIN AVENUE — Detroit Electric — Standard Motor Car Co. 25 NORTH FOURTH STREET — Milburn Electric

*A Co-operative Advertisement by the Dealers in Electrics in Columbus, Ohio. It appeared in the Local Papers and is a Good Example of What Co-operation Will Do.*

# Standardization of Tire Fabric Testing

*By Walter S. Lewis and Charles J. Cleary of the Bureau of Standards, Washington, D. C.**

TO summarize, the test considered best adapted to the conditions is the bone-dry test upon test specimens prepared from test pieces cut from different parts of the sample. If these conditions are carefully complied with, there appears to be no sufficient reason for being unable to make all work strictly comparable, assuming that proper means have been taken to eliminate possibility of difference in testing machines.

### TENSILE STRENGTH DETERMINATIONS UPON DIFFERENT TESTING MACHINES.

During the past two years many disputes have arisen between buyers and sellers of tire fabric relative to tensile strength.

This investigation was undertaken to ascertain what differences in the tensile-strength tests are obtained with various testing machines commonly used by the trade. Five machines of four different makes were employed in these comparative tests.

The cotton-tire fabrics used in the tests were made from combed sea-island fiber and carded Egyptian fiber, the cloth weighing approximately 17¼ ounces per square yard.

Tensile-strength test pieces (A to F, inclusive) were cut from the fabric as indicated in Fig. 5.

Fig. 7 illustrates two pieces of fabric, namely, X and Y. One piece was tested at the mill where the cloth was manufactured, and the other was submitted to this Bureau for test.

All test specimens were 8 inches long by 23 yarns (approximately 1 inch) in width, and a half-inch fringe of yarns extended beyond the specimens on the long sides. These specimens were placed in a ventilated drying oven and dried at 105° C for about two hours, or until all moisture, except that of chemical composition, had been expelled.

Dry-test specimens were taken (one at a time) from the drying oven, and the breaking stress was obtained within 30 seconds.

Each specimen was securely clamped between the jaws of the testing machine, which were 3 inches apart, and the pulling jaw traveled at a uniform rate of 12 inches per minute. Except that different testing machines were employed, all test conditions were identical in this work, so that the results of this series of tests are comparable.

Table 7 shows the results of tensile-strength tests obtained at the particular mill indicated and the results obtained by the Bureau of Standards on test specimens cut from the same piece of fabric.

TABLE 7.

Automobile Tire Fabric—Tensile-Strength Tests.

| Fiber used | Fabric made by | Fabric tested by | Tensile strength (lbs.) Warp | Filling | Av. |
|---|---|---|---|---|---|
| Combed sea island | Mill 1.. | Mill 1 | 214 | 210 | 212 |
| | | Bureau of Standards | 227 | 233 | 230 |
| do | Mill 2.. | Mill 2 | 224 | 234 | 229 |
| | | Bureau of Standards | 213 | 234 | 224 |
| do | Mill 3.. | Mill 3 | 238 | 248 | 243 |
| | | Bureau of Standards | 211 | 226 | 219 |
| do | Mill 4.. | Mill 4 | 259 | 264 | 262 |
| | | Bureau of Standards | 218 | 234 | 226 |
| Carded Egyptian | Mill 3.. | Mill 3 | ... | ... | ... |
| | | Bureau of Standards | 181 | 199 | 190 |
| do | Mill 4.. | Mill 4 | 206 | 214 | 210 |
| | | Bureau of Standards | 180 | 199 | 190 |

Each of the figures in the above table represents the average of a series of tests upon different fabrics. More than 1000 test results have been used in making this table.

The figures shown in Table 8 give the relation of the mill results as compared with those of the Bureau of Standards.

TABLE 8.

| Mill— | Tensile strength (lbs.) Mill results | Bureau of Standards results | Difference | Percentage difference in tensile strength. (Bureau of Standards result is basis of calculation.) |
|---|---|---|---|---|
| No. 1 | 212 | 230 | —18 | 7.8 per cent weaker. |
| No. 2 | 229 | 224 | + 5 | 2.2 per cent stronger. |
| No. 3 | 243 | 219 | +24 | 10.9 per cent stronger. |
| No. 4 | 262 | 226 | +36 | 15.9 per cent stronger. |

The differences between results obtained upon two testing machines are very large in some instances, probably owing to two causes: (*a*) Lack of calibration

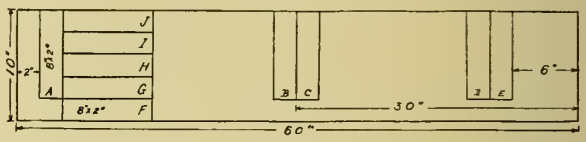



*Fig. 5.—Method of Sampling.*

of instrument and (*b*) some inherent defect in the mechanism of the appartus. The Bureau of Standards therefore strongly recommends that testing machines be calibrated at frequent and regular intervals. It would also suggest that a careful comparative study be made of several of the better types of jaws or clamps which are now upon the market.

### MOISTURE CONTENT OF AUTOMOBILE TIRE FABRIC AND ITS INFLUENCE UPON THE WEIGHT AND TENSILE STRENGTH.

It is well known that cotton fiber is hygroscopic. The extent to which it will absorb or give up its moisture content depends upon the condition of the material and the relative humidity and temperature of the air by which it is surrounded. Under changing atmospheric conditions, tire fabric may sometimes vary in moisture content from 3.5 to 8.5 per cent.

Automobile tire fabric is usually sold in rolls of from 100 to 500 yards each. In some instances moisture is intentionally added to the cloth when it is

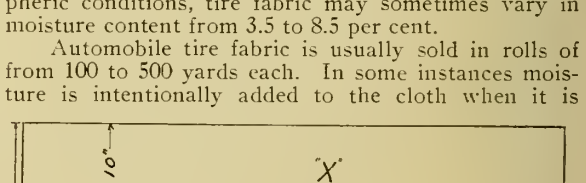



*Fig. 7.—Method of Selecting Test Specimens.*

rolled for shipment. This moisture is sometimes added to increase the weight and strength of the fabric and sometimes to improve its appearance. Cotton tire fabric under such conditions may contain from 3.5 to 10.5 per cent of moisture per 100 parts of dry material.

The quantity of uncombined water present in the fiber has a marked influence upon the weight and

* Concluded from last month.

strength of the fabric; to a less degree, the width and elongation and the crimp of the yarn.

From preliminary tests upon combed sea island tire fabric the results have shown that for each 1 per cent of moisture content, upon the basis of 100 parts dry material, there is an increase in tensile strength of approximately 7 per cent. This ratio of strength to moisture content was based upon results obtained from tests upon fabrics which contained from 0 to 10 per cent of moisture.

If dry fabric, therefore, has a tensile strength of 200 pounds per inch of width, it would test 249 pounds with 3.5 per cent moisture, 319 pounds with 8.5 per cent, and more than 325 popnds with 10.5 per cent moisture content. There is thus a difference of 70 pounds in tensile strength of the same fabric caused by a 5 per cent difference in its moisture content, i. e., between 3.5 per cent and 8.5 per cent.

A consideration of the variation in weight of fabric is also important, especially when it is bought upon the pound basis. What is known as a 17¼-ounce tire fabric, under so-called normal atmospheric conditions, will weigh approximately 16½ ounces under bone-dry conditions. Therefore, with 3.5 per cent moisture it would weigh 17.08 ounces and with 8.5 per cent moisture 17.90 ounces per square yard, a difference of about 5 per cent in weight. On a roll of 500 yards a difference of 5 per cent in weight would mean 25 pounds.

Many tests for the determination of moisture have been made during the past year upon 17¼-ounce tire fabric. The particular fabrics employed in this preliminary investigation were produced and tested by four prominent cotton mills, three located in the North and one in the South, and all tests were made upon cloth which did not have moisture added artificially when being wound into a roll. In other words, the rolls were shipped in box cars to the purchaser as wound under the normal conditions of the mill. The rolls were sometimes exposed for a few days only, while in other instances they were exposed for weeks to the different air conditions that obtain in the winter months in unheated cars and during the summer months in ordinary box cars.

The test included altogether more than 200 rolls and more than 400 samples were tested. The results were as follows:

| | Per cent |
|---|---|
| Mill No. 1 | 4.6 |
| Mill No. 2 | 4.8 |
| Mill No. 3 | 5.4 |
| Mill No. 4 | [a]4.6 |
| Average | 4.85 |

[a] *Southern Mill.*

The extreme variation of moisture was between 3.5 and 6.5 per cent, no single sample reaching as high as 7 per cent.

## Faults of 1916 Cars

The whole question of brakes and springs has been most admirably summed up by A. Ludlow Clayden and L. V. Spencer, in a paper presented at a meeting of the Society of Automobile Engineers, entitled "Trend and Possibilities of Automobile Design"—an analysis of designs seen at the shows.

They say there are two things in which the average car of 1916 is lacking, and two important things—first, the brakes, and second, the steering. While engineers of all countries have been devoting their time and study to making the automobile go forward, few of them have given much attention to the equally important matter of keeping it under proper control. The car of 1916 is much faster than the car of 1904, yet it is practically no easier to steer or stop.

In designing brakes, the mathematics of the question ought to be considered, and then should be followed by proper tests of brake-surface materials, of details of shoe design, and so on. A brake ought to act smoothly and quietly, and without more than 20 lbs. of pressure on the pedal. It ought to remain in perfect condition for at least 10,000 miles of driving, and when adjustment is needed it ought to be made by turning a single thumbnut. It is possible to make brakes like this, but it is not easy, because so very little is known about the fundamentals of the subject.

When a brake is applied the car as a whole tries to turn around on the axle; so applying a rear-wheel brake puts on a torque which is resisted by the pressure of the front wheels on the ground, they forming the other end of the lever. If the adhesion of the rear wheels is insufficient, so that one of them locks, that wheel is instantly useless for steering, and if the second locks, the whole axle cannot be steered.

Another matter of design that seems to be in a doubtful state is that of springs. A year ago we heard all sorts of absurd claims made for the cantilever, rebutted by equally absurd arguments against it. Today we see all sorts of springs giving just about the same service. The type of spring used on the Marmon and the Moline shows that there is still a possibility of new ideas in spring suspensions, so that this stands out as one of the things in which uncertainty till obtains. In the Fergus car, shown at New York, we see yet another spring idea that has waited for years to bring forth, and is yet the simplest of common sense when you see it. Why not enclose a spring as Fergus has done, so as to keep it in its original condition of efficiency instead of leaving it open to the attacks of water and grit, which steadily reduce its efficiency, beginning from the first day the car goes on the road? Argued from this viewpoint, you might as well make a transmission with exposed gears, as Levassor did for the Panhard Company eighteen years ago.

## Boston Battery Exchange System Growing

The Boston Edison Company's battery exchange service has added eleven more trucks to its system through its manager, Charles H. Miles. These trucks are being operated by six different firms. Six of them are of 3.5-ton capacity each, and are to be operated by a contractor in street sprinkling and flushing and oiling for the city of Boston. The tanks for these purposes are to be removable and dumping bodies substituted for the collection of city ashes during the winter, the vehicles thus serving a double purpose.

The other trucks using this service are four two-ton and one 1,000-pound wagons, which are owned by a metal-working concern, a spring water company, a Newton market man, and a leading Boston coffee wholesaling house. The charging, and in some cases the garaging, is also provided by the Boston Edison Company at its Atlantic avenue electric garage, the rates being based on mileage rather than on current furnished.

The chassis are of the well-known General Vehicle Company manufacture, the batteries are the Exide Ironclad of the Electric Storage Battery Company of Philadelphia.

# Brevities of the Business

*The Activities of the Electric Motor Car Field Told in Short Paragraphs*

*PERSONAL NOTES*

Harry G. Peters, formerly treasurer of the Boss Rubber Company, Denver, is now president of the Peters, Tucker, Hay Rubber Company of Denver.

Frank C. Stover is now manager of the municipal department of the United States Tire Company at 1222 Michigan avenue, Chicago. He was formerly with the Star Electric Company of Chicago.

B. W. Collins, Detroit, Mich., formerly assistant treasurer of the old Lozier Motor Co., and for some time connected with the United States Tire Co., has been appointed assistant treasurer and assistant to the president of the Springfield Body Co.

Mr. Johnston of the Johnston-Moody Co., of Peoria, Ill., who has given up the Argo to take on the Detroit Electric, reports that if sales keep up during the year Peoria will rank as one of the best electric motor car cities in the Central West.

O. Bruenauer, formerly western sales manager of the Gurney Ball Bearing Company, will assume duties as general sales manager of the company on June 1 at Jamestown, N. Y., where the factory is located. The service engineering department of the company, heretofore located here, will also be removed to Jamestown.

C. F. Ball and J. E. Ball, Springfield, have opened a garage at 327-329 North Sixth Street, and will specialize in electric and battery work. They will do a repair business exclusively, carrying a line of supplies and accessories.

W. G. Dickey, 1441 Wazee street, Denver, Monogram Oil distributor for Colorado, Wyoming, New Mexico, Nebraska, Kansas, Oklahoma, and Western Missouri, has opened a warehouse and branch office at Kansas City.

A. B. Shaw, San Diego, California representative, reports a heavy business in electrics. The Exposition is helping his Milburn sales wonderfully.

T. C. Reid, manager of Detroit city sales of the Detroit Electric Car Co., announces the appointment of W. G. Lynn to his sales organization. Mr. Lynn has had a great deal of experience in the electric car field and joins the Detroit Electric organization with the best wishes of all his friends.

H. G. White has joined the Pennsylvania Rubber Company as New England traveling representative.

A. B. Swanger, head of the United Electric Vehicle Co. of Oakland, Cal., has found business so heavy in his northern California territory with the Detroit Electric that he has opened up a branch house at San Francisco.

R. W. Cady has opened up the Auto Appliance Co. at Tacoma, Wash. He will handle the Federal and Goodyear tires and a well selected line of accessories.

James D. Fulton, former automobile editor of the Chicago *Record-Herald*, has just become vice-president of the Carl M. Green Company of Toledo, Ohio, advertising agents. Mr. Fulton will help prepare copy for advertising such cars as the General Motors Truck, and the Detroit Electric. His forceful and attractive personality should win bigger business to the electric field.

G. A. Dodge, who has spent a number of years in the manufacturing and engineering departments of several of the largest tire companies in the country has become chief engineer and factory manager for the Dayton Rubber Mfg. Co., Dayton, Ohio.

On May 1 the Minneapolis branch office of the Stewart-Warner Speedometer Corp. will move into its new quarters at 1309 Hennepin avenue.

S. F. Dupree, Jr., formerly head of the Ford department of the Westinghouse Electric & Mfg. Co., Pittsburgh, Pa., has associated himself as vice-president in charge of sales and advertising of the Caskey-Dupree Mfg. Co., Chicago.

J. W. Spray has changed his affiliations and is now connected with the sales force of the Timken Roller Bearing Co., Canton, Ohio. He was until recently sales representative in the Middle West of the Diamond Chain Co., Indianapolis, Ind.

On June 1, G. L. Sullivan, who has been associated with Bromfield & Field, Inc., advertising agency, New York City, will become advertising manager of the company of the Fisk Rubber Co.

Volney Beardsley of Los Angeles, has left for an extended trip east. He will visit the N. E. L. A. convention where his company will exhibit at Chicago and be there for some time before going eastward.

R. J. Goldie has become factory manager of the Columbia Axle Company, Cleveland, Ohio. For the past two years he was works manager of the Metal Products Company. Previous to that he was with the Chalmers Motor Company for five years.

Woodworth Campbell, Sacramento, California, agent for the Milburn, has recently renovated his salesrooms, making them far more attractive than before.

Arthur E. Linsden is in America on a short business trip. He has charge of the B. F. Goodrich Paris factory, which was opened some five years ago.

J. Lee Etheredge has been appointed Anderson representative at Augusta, Georgia.

G. A. House, formerly factory superintendent of the Houk Manufacturing Company, Buffalo, N. Y., is promoting a new company for the manufacture of wire wheels.

Miss M. G. Webber, who has supervised the Fisk advertising in the past and G. B. Hendrick, who has been in charge of publicity, will act as assistants to Manager Sullivan.

C. E. Robertson, who was for four years commercial manager of the Consolidated Gas, Electric Light and Power Company, Baltimore, has been appointed sales manager of the General Vehicle Company, Inc., and is now actively engaged in directing the distribution of the vehicles produced by that concern.

R. G. Beechler, formerly chief engineer of the Timken-Detroit Axle Company, metal products branch, has been promoted to the position of works manager to succeed R. J. Goldie, who has resigned. Mr. Beechler was identified with the Metal Products Company in an engineering capacity, coming to that organization as chief tool designer.

C. A. Burrell, who has been connected with the Willard Storage Battery Co., Cleveland, O., for a number of years in the capacity of credit and advertising manager, has resigned his position with that company to accept the secretaryship and general managership of the Kemco Electrical Mfg. Co., Cleveland, manufacturers of lighting and starting equipment.

H. H. Dennis, manager, the Electric Sales & Service Co., sold 19 new Detroit Electric cars in Toledo during the month of April. Mr. Dennis attributes his success to the service given with every Detroit Electric. Every purchaser of a new Detroit Electric car is given free monthly service for one year, embodying general examination of car, motor and battery oiling, greasing, inflating tires, flushing and bringing up specific gravity of battery. This is real electric car service. After the first year they continue this same service at $30.00 per year.

E. A. Cousins, engineer in charge of the New York Automobile Service Department of the Westinghouse Electric & Mfg. Company, has resigned to become general superintendent of the Daniels Motor Car Company, Reading, Pa.

Frank McCall, secretary of the Chicago Section of the Electric Vehicle Section of the N. E. L. A., has a list in preparation of all the cars in Chicago with the owners, models, year service and other data. It will be the most complete list of its kind when finished. Mr. McCall is now with the Philadelphia Storage Battery Co., at 1621 Michigan avenue, Chicago.

The many friends and acquaintances of C. H. Kinney have been congratulating him on his recent promotion. Mr. Kinney is one of the veteran electric car service men on Automobile Row. Until recently he was superintendent of the passenger car service department for Chicago Electrics. His promotion makes him superintendent of service of not only the Passenger Car Division, but the commercial car division as well, of the Walker Vehicle Company. His new work puts him in charge of all service matters pertaining to Chicago Electrics as well as numerous large fleets of commercial cars operated by many Chicago concerns.

# Central Station Men and Dealers

## Why Not Start a Selling Campaign on the California Built

PLEASURE **Beardsley Electric** COMMERCIAL

CARS

**Manufactured in a State**
***"Where Nature Helps Industry Most"***

California has produced the Longest Mileage Electric Car on the American Market—THE BEARDSLEY
California has produced the Lowest Priced Serviceable Electric Car on the American Market—THE BEARDSLEY



**The Beardsley Light Coupe, $1335.00 F. O. B. Chicago**




**The Beardsley Light Delivery Car, Complete with Batteries and Body, $1235.00 F. O. B. Chicago**

Deliveries can be made, through Agents, to any city in the United States at approximately these prices.
We have many other attractive Models up to $3000.00.
Reliable Representatives desired in all Territory Not Closed.

## BEARDSLEY ELECTRIC CARS ARE NOW IN CHICAGO

See the Beardsley Exhibit at the National Electric Light and Electric Vehicle Association Convention at Auditorium Theatre Building, May 22nd to 26th, 1916.

Meet Volney S. Beardsley, Pres.-Manager, in charge of Exhibit with temporary headquarters at the Auditorium Hotel.

After the Convention see the Cars at the Fashion Garage, 740 East 51st Street.

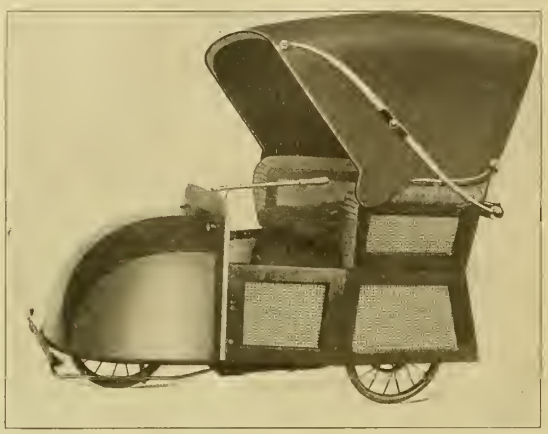
***Watch Announcements Later or Write Direct to***

# Beardsley Electric Company

**1250-60 W. 7th St. - - Los Angeles, Calif.**

## THE ARISTOCRAT OF MOTOR VEHICLES

### DESIGNED FOR PARKS, SHOPPING TOURS, RESORTS AND HOSPITALS



IT contains all the advantages in ease of handling, cheapness of operation and *safety*.

By coming in contact with any obstacle the current is automatically cut off and brakes set.

The chair can be adjusted to any speed, from one to eight miles an hour, and is equipped with rubber tires and ball bearings, weighing complete 400 pounds.

The bodies, of rattan or pressed steel, comfortably cushioned, are made in various forms to suit the requirements of purchaser or will be built to their individual designs.

The Company is now prepared to manufacture and sell chairs either to individuals or to dealers in quantities.

Territory will be allotted to Agents commencing July 1st, 1916. A practical demonstration, or full printed details will be furnished upon request.

*Address*

**Motor Chair Sales and Operating Co.**
808 Westminster Building
Chicago, U. S. A.

## VOLKCAR

## Storage Batteries

¶ Have been carefully built for twelve years under the direct supervision of John M. Volkhardt, Jr., who owns over 80 per cent of the stock of Volkcar Storage Battery Co.

¶ These Batteries are endorsed and used by the leading manufacturers of Electric Vehicles.

**Volkcar Storage Battery Company**
2437-39 Michigan Avenue
CHICAGO, ILLINOIS

## A Subscription to Electric Vehicles Helps to Solve Your Selling Problems

¶ Send along the name of your prospect, and with the the first copy of ELECTRIC VEHICLES will be sent a card telling that it comes from you and will be a visitor for a year, a monthly reminder of your good will and friendly interest.

¶ If you have one prospect the cost will be one dollar and fifty cents.

¶ One lucky dealer with twenty prospects sent his entire list.

¶ He sold sixteen of them!

**Electricity Magazine Corporation**
MONADNOCK BUILDING
CHICAGO, ILL.

# The Ohio Electric





DRIVING an Ohio Electric is an unalloyed pleasure, born of a confidence-inspiring ease and simplicity of operation. The exclusive double drive, with magnetic control and magnetic brake, eliminates all mechanical worry.

And the owner of an Ohio is proudly conscious of the possession of a car which superbly exemplifies the finest creative effort of designer and builder, in every line and every accessory.

*Descriptive literature on request*

THE OHIO ELECTRIC CAR COMPANY, TOLEDO, O.

OHIO
THE ENVIED ELECTRIC

CHICAGO ELECTRIC

# This Season's Sales of
# *Chicago Electrics*
## more than double that of last year

The new Edison Models most successfully meet the requirements of the careful buyer. Chicago Electrics besides enjoying a present success have a record for past performances. The demand for "the best built Electric in America" testifies for its built-in satisfaction, service and economy.

*For the first time this year we are in a position to make a few immediate deliveries on Chicago Electric Edison Models*

# Walker Vehicle Company

CHICAGO SALESROOM
2700 Michigan Avenue
Telephone Calumet 3000

EVANSTON BRANCH
1013-15 Davis Street
Telephone Evanston 481

Factory: Thirty-ninth and Wallace Streets, Chicago



SMITHSONIAN INSTITUTION LIBRARIES
3 9088 01548 7960